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English for IT:

part 1

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PREFACE

Настоящее учебное пособие включает актуальные тексты учебно-познавательной тематики для магистрантов специальности «Прикладная математика и информатика».

Целью данного пособия является формирование навыка чтения и перевода научно-популярных и собственно научных текстов, а также развитие устной научной речи обучающихся.

Пособие состоит из 4 разделов, рассматривающих проблемы и достижения в сфере информационных технологий в современном мире. Каждый из них содержит аутентичные материалы (источники: *Aeon, BBC Future, Nautilus, The Guardian*) и упражнения к ним.

Пособие может успешно использоваться как для аудиторных занятий, так и для внеаудиторной практики.

1. Absolute English

Part 1

Exercise I.

Say what Russian words help to guess the meaning of the following words: detail, physics, chemistry, biology, geology, conference, polyglot, dispute, humanist, competence

Exercise II.

Make sure you know the following words and word combinations: superficiality, to sustain, efficient, vicinity, to shunt, outlandish, scientific research facility, vanquish, to start way back, on the contrary, as a first language, to acquire competence in foreign languages

Absolute English

Science once communicated in a polyglot of tongues, but now English rules alone. How did this happen – and at what cost?

If you can read this sentence, you can talk with a scientist. Well, maybe not about the details of his research, but at least you would share a common language. The overwhelming majority of communication in the natural sciences today – physics, chemistry, biology, geology – takes place in English; in print and at conferences, in emails and in Skype-mediated collaborations, confirmable by wandering through the halls of any scientific research facility. Contemporary

science is Anglophone. More significantly, contemporary science is *monoglot*: everyone uses English almost to the exclusion of other languages. A century ago, the majority of researchers in Western science knew at least some English, but they also read, wrote and spoke in French and German, and sometimes in other languages, such as the newly emergent Russian or the rapidly fading Italian. The past polyglot character of modern science might seem surprising. Surely it is more efficient to have one language? How much time would be lost learning to read and write three languages! If everyone uses the same language, there is less friction caused by translation – such as priority disputes over who discovered what first when the results appear in different tongues. By this view, contemporary science advances at such a staggering rate precisely because we have focused on 'the science' and not on superficialities such as language. This point is much easier to sustain if the speaker grew up speaking English, but the majority of scientists working today are actually not native English speakers. When you consider the time spent by them on language-learning, the English-language conquest is not more efficient than polyglot science – it is just differently inefficient. There's still a lot of language learning and translation going on, it's just not happening in the United Kingdom, or Australia, or the United States. The bump under the rug has been moved, not smoothed out. (1)

Yet today's scientists are surrounded by Anglophonia, and the rapid churn of scientific research shortens memories. Wasn't science always this way? No, it was not, but only much older scientists recall how it used to be. Often, scientists or humanists assume that English

science replaced monoglot German, preceded by French and then by Latin. Understanding the history of science as a chain of monolingual transfers has a certain appeal, but it isn't true. Never was. To paint with a very broad brush, we can observe two basic linguistic regimes in Western science: the polyglot and the monoglot. The latter is quite new, emerging just in the 1920s and vanquishing the centuries-old multilingual regime only in the 1970s. Science speaks English, but the first generation who grew up within that monoglot system are still alive. To understand how this important change happened, we need to start way back. In the 15th century in western Europe, natural philosophy and natural history – the two domains of learning that would, by the 19th century, come to be known as 'science' – were both fundamentally polyglot enterprises. This is the case despite the fact that the language of learning in the Middle Ages and the Renaissance was Latin. This unusual status of Latin does not contradict the polyglot system; on the contrary, it confirms it. Learning, learned people knew, was a multilingual enterprise. So was life. No one learned Latin as a first language and few used it orally. Latin was for *written* scholarship, but everyone who used deployed it alongside other languages that they used to communicate with servants and family members. Latin was used to bridge linguistic communities, and it was understood as more or less neutral. Perhaps most importantly, since Latin was no specific nation's native tongue, and scholars all across European and Arabic societies could make equal use of it, no one 'owned' the language. But everyone in this conversation was polyglot, choosing the language to suit the audience. This system started to break down in the 17th century, in the

midst of, and as an essential part of, what was once dubbed ‘the scientific revolution’. Across Europe, scholars began to use translations into Latin and French flourished to enable communication. By the end of the 18th century, works in chemistry, physics, physiology and botany appeared increasingly in English, French and German, but also in Italian, Dutch, Danish and other languages. Until the first third of the 19th century, many learned elites still opted for Latin. (2)

In 19th century many languages seemed wasteful; spend all your time learning languages in order to read the latest in natural philosophy, and you’d never do any research. Around 1850, the scientific languages began to compress to English, French and German, each occupying roughly equal proportions of total production (although each science had a different distribution: by the end of the century, German was the front-runner in chemistry). There were advocates of only one language for scientific learning, citing precisely the neutrality Latin had enjoyed in earlier centuries. They called for Esperanto. They made cogent arguments, the same arguments you hear for English today. But something obviously changed. We now live in the Esperantists’ dreamworld, but the universal language of natural science is English, a language that is the native tongue of some very powerful nation states and as a consequence not at all neutral. What happened to the polyglot system of science? It broke. More accurately, it was broken. After the Second World War, the story increasingly becomes one of demographics and geopolitics. Scientists from the rising American empire of the 20th were not expected to acquire competence in foreign languages. The massive bulk of Soviet scientists and engineers that rose up after the

war, however, presented the US with a new scientific competitor. In the 1950s and ’60s, with about 25 per cent of world publication, Russian became the second most dominant scientific language, trailing the 60 per cent of English. The American inability – or refusal – to learn Russian, let alone other foreign languages, in order to conduct their science, combined with the export of an Americanised science system across the Atlantic to Anglophone and non-Anglophone countries alike, propelled the Anglicisation of science. The willingness of Europeans, Latin Americans and others to accede to this new monolingual regime also played a role. Since they wanted to be cited by the leaders of the field, the Dutch and Scandinavians ceased publishing in French or German and switched to English. As the Cold War progressed, publishing in Russian was interpreted as a clear political statement. Meanwhile, generations of scientists around the world continued to learn English, but this odd development in the history of science often did not register as deeply political. By the early 1980s, English was occupying well over 80 per cent of world publication in the natural sciences. Now it hovers in the vicinity of 99 per cent. (3)

So what? Maybe the apostles of efficiency have it right, and science is now better for being communicated in one language – the evident successes of recent science might be interpreted in this light. Yet we should also appreciate the costs. In 1869, Dmitri Mendeleev almost lost credit for his development of the periodic table because he had published in Russian not German, and today publishing in a fast-paced field in anything other than English – and in anything other than a leading journal – leads to work being ignored. French mathematicians often proudly publish in French, where the formalism aids the

Anglophones in following the proofs. In heavily experimental sciences with fewer equations, such a luxury is unthinkable. How many promising students are shunted out of a scientific career because they have a hard time with English? The problem becomes more severe as the world's textbook production, even for high schools, shifts to Anglophone. Monoglot science comes with a price. (4)

Once established, however, it seems rather stable. It is dangerous to speculate about the future of scientific languages when the present is literally unprecedented. Never before has there been such a monoglot system of scientific communication. Two things, however, can be stated with confidence. First, it takes a lot of energy to maintain a monoglot system on such a scale, with enormous resources poured into language training and translation in non-Anglophone countries. And, second, if the Anglophone nations were to vanish tomorrow, English would still be a significant language of science, simply because of the vast inertia of what already exists. Just ask your nearest scientist. He'll understand you. (5)

Adapted from Aeon.

Exercise III.

Find paragraphs, dealing with the following: vanquish, domain, contradict, confirm, wasteful, front-runner, cogent, propel, hover, fast-paced.

Exercise IV.

Fill in the gaps according to the text.

1. The overwhelming majority of communication in the natural sciences today – physics, chemistry, biology, geology – takes place in ……
2. Contemporary science is……..
3. Contemporary science is……..: everyone uses English almost to the exclusion of other languages.
4. We can observe two basic linguistic regimes in Western science: the ……..and the monoglot.
5. In the 15th century in western Europe, natural philosophy and natural history – the two domains of learning that would, by the 19th century, come to be known as ‘science’ – were both fundamentally …….enterprises.
6. In 1869, ……almost lost credit for his development of the periodic table because he had published in Russian not German, and today publishing in a fast-paced field in anything other than English – and in anything other than a leading journal – leads to work being ignored.
7. In 19th century many languages seemed…….
8. Around 1850, the scientific languages began to compress to English, French and ……..
9. By the end of the century, German was the front-runner in ……...

10. In the 1950s and ’60s, with about 25 per cent of world publication …became the second most dominant scientific language, trailing the 60 per cent of English.

Exercise V .

Make up sentences of your own with the following word combinations: in print, at conferences, in Skype-mediated collaborations, any scientific research facility, to the exclusion of other languages, by this view, to advance at a staggering rate, native English speakers, to acquire competence in foreign languages.

Exercise VI.

Determine whether the statements are true or false. Correct the false statements:

1. Contemporary science is monoglot: everyone uses German almost to the exclusion of other languages.
2. The majority of scientists working today are actually native English speakers.
3. We now live in the Esperantists’ dreamworld, but the universal language of natural science is English, a language that is the native tongue of some very powerful nation states and as a consequence not at all neutral.
4. In the 15th century in western Europe, natural philosophy and natural history – the two domains of learning that would, by the 19th century, come to be known as ‘science’ – were both fundamentally monoglot enterprises.
5. The language of learning in the Middle Ages and the Renaissance was Latin.

6. Learning, learned people knew, was a multilingual enterprise.
7. No one learned Latin as a first language and few used it orally.
8. By the end of the 17th century, works in chemistry, physics, physiology and botany appeared increasingly in English, French and German, but also in Italian, Dutch, Danish and other languages.
9. Until the first third of the 18th century, many learned elites still opted for Latin.
10. By the end of the century, German was the front-runner in history.

Exercise VII .

Match the words to the definitions in the column on the right:

vanquish	to bring the memory of a past event into your mind, and often to give a description of what you remember
monoglot	the study of people and society in a particular area or particular group
geopolitics	starting to exist or to become known
friction	speaking or using several different languages
recall	disagreement
emergent	the act of conquering a country, area, or situation
consider	the study of the way a country's size, position, etc.influence its power and its relationships with other countries
polyglot	to defeat an enemy or opponent

conquest	to spend time thinking about a possibility or making adecision
demographics	using or speaking only one language

Exercise VIII.

Summarize the article "Absolute English."

Part 2

Exercise I.

Identify the part of speech the words belong to: confirmable, emergent, friction, linguistic, scholar, enable, wasteful, cogent, demographics, geopolitics

Exercise II .

Form nouns from the following words:

conquer (1), contradict (2), equal (2), communicate (2), translate (2), accurately (3), competence (3), refuse (3), evident (4), appreciate (4)

Exercise III.

Find synonyms to the following words. Translate them into Russian:

rapidly (1), dispute (1), sustain(1), recall (2), to assume (2), to opt (2), compress (3), dominant (3), to cease (3), progress(3)

Exercise IV .

Find antonyms to the following words. Translate them into Russian:

rapidly (1), common (1), monoglot (1), majority (1) , natural (1), contradict (2), equal (2), total (3), stable (5), significant (5)

Exercise V.

Match the words to make word combinations:

native	system
the Middle	argument
multilingual	collaborations
natural	production
scientific	members
polyglot	tongue
cogent	regime
total	science
Skype-mediated	revolution
family	Ages

Exercise VI .

QUIZ (Programming Languages)

A computer programming language is a tool that communicates instructions to machines. There are many languages around and together we will explore some of them.

1) One of the earliest computer programming languages was introduced by IBM in 1957. The language was a group effort led by John Backhus. The aim of the language was to help with translating mathematical formulas into machine understandable code. What is the name of this scientific language?

A. TRANFORM

B. TRANSFORM

C. FORMULAX

D. FORTRAN

2) This computer programming language was designed by a committee of scientists and the first release was introduced in 1958. What is the name of this language that was created to meet the need for scientific calculations?

A. ALDOL

B. ALLAN

C. ALGOL

D. ARGON

3) In the early 1970s Dennis M. Ritchie, an employee of AT&T, came up with which single letter computer programming language?

A. Y

B. Z

C. C

D. X

4) This language was developed in the early 1980s by a team headed by Dr. Jean Ichbiah at CII-Honeywell-Bull in France. The language was named after which mathematician, who is also considered to be the first programmer?

A. Augusta Ada Lovelace

B. Ada Fisher

C. Florence Ada Keynes

D. Ada Louise Huxtable

5) This computer programming language was introduced by Niklaus Wirth in late 1970. What is the name of the language that was named after a famous French mathematician?

A.PASCAL

B. GAUSS

C. DESCARTES

D. EULER

6) This language was originally developed by James Gosling at Sun Microsystems in 1991 and was intended for interactive television. The original name for the product was Oak but following a brainstorming meeting was named after which type of coffee?

A. Typica

B. Arabica

C.Java

D. Kona

7) Visual Basic, a third generation language, was released in 1991 and declared legacy in 2008. Which corporation released this easy to learn language?

A. Motorola

B. Oracle

C. Microsoft

D. Nokia

8) This language is used to create Web pages and it is the child of physicist Tim Berners- Lee who wrote the product in 1990. What is the name of this language that uses markup tags?

A. HAL/S

B. HTML

C. HLSL

D. HAXE

9) Dutch programmer Guido van Rossum started implementing this language in late 1989. What was the name of this "reptilian" language that was inspired by Rossum's favourite TV show?

A. Python

B. Toad

C. Cobra

D. Salamander

10) Computer scientist and programmer Yukihiro Matsumoto released this language in late 1995. After discussions with a colleague they decided to name the new language... (after which red gem?)

A. Amethyst

B. Ruby

C. Aquamarine

D. Agate

2. Why bad ideas refuse to die

Part 1

Exercise I.

Say what Russian words help to guess the meaning of the following words: astrophysicist, serious, professional, consultant, brilliantly, zombie, normal, phrase, economic

Exercise II.

Make sure you know the following words and word combinations.

to dismiss, ridiculous, to wither away, to join in the conversation, spherical, latitude, to cast a shadow on, lunar eclipse, space travel, clue, compelling, to derange, awe-inspiring, outlandish, coherence, to contribute, commodity, intelligence service, rigorous, dazzling, validity, well-grounded, stern.

Why bad ideas refuse to die

They may have been disproved by science or dismissed as ridiculous, but some foolish beliefs endure. In theory they should wither away – but it's not that simple

In January 2016, the rapper BoB took to Twitter to tell his fans that the Earth is really flat. The astrophysicist Neil de Grasse Tyson joined in the conversation, offering friendly corrections to BoB's zany proofs of non-globism, and finishing with a sarcastic compliment:

“Being five centuries regressed in your reasoning doesn’t mean we all can’t still like your music.” Actually, it’s a lot more than five centuries regressed. Contrary to what we often hear, people didn’t think the Earth was flat right up until Columbus sailed to the Americas. In ancient Greece, the philosophers Pythagoras and Parmenides had already recognised that the Earth was spherical. Aristotle pointed out that you could see some stars in Egypt and Cyprus that were not visible at more northerly latitudes, and also that the Earth casts a curved shadow on the moon during a lunar eclipse. The Earth, he concluded, must be round. The flat-Earth view was dismissed as simply ridiculous – until very recently, with the resurgence of apparently serious flat-Earthism on the internet. An American named Mark Sargent, formerly a professional videogamer and software consultant, has had millions of views on YouTube for his Flat Earth Clues video series. The Flat Earth Society is alive and well, with a thriving website. What is going on? Many ideas have been brilliantly upgraded for the modern age, and their revival seems newly compelling. Some ideas from the past, on the other hand, are just dead wrong and really should have been left to rot.These are zombie ideas. You can try to kill them, but they just won’t die. And their existence is a big problem for our normal assumptions about how the marketplace of ideas operates. The phrase “marketplace of ideas” was originally used as a way of defending free speech. Just as traders and customers are free to buy and sell goods in the market, so freedom of speech ensures that people are free to exchange ideas, test them out, and see which ones rise to the top. Just as good consumer products succeed and bad ones fail, so in the marketplace of ideas the truth will win out,

and error and dishonesty will disappear. There is certainly some truth in the thought that competition between ideas is necessary for the advancement of our understanding. But the belief that the best ideas will always succeed is rather like the faith that unregulated financial markets will always produce the best economic outcomes. As Christine Lagarde put this standard wisdom in Davos: “The market sorts things out, eventually.” Maybe so. But while we wait, very bad things might happen. Zombies don’t occur in physical marketplaces – take technology, for example. Zombies such as flat-Earthism simply shouldn’t be possible in a well-functioning marketplace of ideas. And yet – they live. How come? (1)

One clue is provided by economics. It turns out that the marketplace of economic ideas itself is infested with zombies. After the 2008 financial crisis had struck, the Australian economist John Quiggin published his work called Zombie Economics, describing theories that still somehow shambled around even though they were clearly dead, having been refuted by actual events in the world. An idea will have a good chance of hanging around as a zombie if it benefits some influential group of people. One of the paradoxes of zombie ideas, though, is that they can have positive social effects. The answer is not necessarily to suppress them, since even apparently vicious ideas can lead to productive research. Few would argue that a commercial marketplace *needs* fraud and faulty products. But in the marketplace of ideas, zombies can actually be useful. Or if not, they can at least make us feel better. That, paradoxically, is what I think the flat-Earthers of today are really offering – comfort. Today’s rejuvenated flat-Earth philosophy,

as promoted by rappers and YouTube videos, is not simply a recrudescence of pre-scientific ignorance. It is, rather, the mother of all conspiracy theories. The point is that everyone who claims the Earth is round is trying to fool you, and keep you in the dark. In that sense, it is a very modern version of an old idea. As with any conspiracy theory, the flat-Earth idea is introduced by way of a handful of seeming anomalies, things that don't seem to fit the "official" story. Have you ever wondered, the flat-Earther will ask, why commercial aeroplanes don't fly over Antarctica? It would, after all, be the most direct route from South Africa to New Zealand, or from Sydney to Buenos Aires – *if* the Earth were round. But it isn't. There is no such thing as the South Pole, so flying over Antarctica wouldn't make any sense. Plus, the Antarctic treaty, signed by the world's most powerful countries, bans any flights over it, because something very weird is going on there. So begins the conspiracy sell. Well, in fact, some commercial routes do fly over part of the continent of Antarctica. The reason none fly over the South Pole itself is because of aviation rules that require any aircraft taking such a route to have expensive survival equipment for all passengers on board – which would obviously be prohibitive for a passenger jet. OK, the flat-Earther will say, then what about the fact that photographs taken from mountains or hot-air balloons don't show any curvature of the horizon? It is perfectly flat – therefore the Earth must be flat. Well, a reasonable person will respond, it looks flat because the Earth, though round, is really very big. But photographs taken from the International Space Station in orbit show a very obviously curved Earth. And here is where the conspiracy really gets going. To a flat-Earther, any photograph from

the International Space Station is just a fake. So too are the famous photographs of the whole round Earth hanging in space that were taken on the Apollo missions. Of course, the Moon landings were faked too. This is a conspiracy theory that swallows other conspiracy theories whole. According to the flat-Earth theory, space travel had to be faked because there is actually an impermeable solid dome enclosing our flat planet. The US and USSR tried to break through this dome by nuking it in the 1950s: that's what all those nuclear tests were really about. (2)

The intellectual dynamic here, is one of rejection and obfuscation. It is tempting to suppose that some of the leading writers (or, as fans call them, "researchers") on the topic are cynically having some intellectual fun, but there are also a lot of true believers who find the notion of the "globist" conspiracy consonant with their idea of how the world works. You might think that the really obvious question here, though, is: what purpose would such an incredibly elaborate and expensive conspiracy serve? What exactly is the point? It seems to me that the desire to believe such stuff stems from a deranged kind of optimism about the capabilities of human beings. It is a dark view of human nature, to be sure, but it is also rather awe-inspiring to think of secret agencies so powerful that they really can fool the world's population over something so enormous. It is all too tempting to take science fiction for truth – because narratives always make more sense than reality. We know that it's a good habit to question received wisdom. Sometimes, though, healthy scepticism can run over into paranoid cynicism. One reason why myths and urban legends hang around so long seems to be that we like simple explanations and are

inclined to believe them. The yearning for simple explanations also helps to account for the popularity of outlandish conspiracy theories that paint a picture of all the world's evils as being attributable to a cabal of supervillains. Maybe a secret society really is running the show – in which case the world at least has a weird kind of coherence. And what happens when the world of ideas really does operate as a marketplace? It happens to be the case that many prominent climate sceptics have been secretly funded by oil companies. The idea that there is some scientific controversy over whether burning fossil fuels has contributed in large part to the present global warming is an idea that has been literally bought and sold, and remains extraordinarily successful. That, of course, is just a particularly dramatic example of the way all western democracies have been captured by industry lobbying, in which friendly consideration of ideas that increase the profits of business is simply purchased, like any other commodity. If the marketplace of ideas worked as advertised, it would be impossible in general for ideas to stay rejected for hundreds or thousands of years before eventually being revived. Yet that too has repeatedly happened. While the return of flat-Earth theories is silly and rather alarming, meanwhile, it also illustrates some real and deep issues about human knowledge. How, after all, do you or I know that the Earth really is round? Essentially, we take it on trust. We may have experienced some common indications of it ourselves, but we accept the explanations of others. The experts all say the Earth is round; we believe them, and get on with our lives. The truth is that we all depend on experts for most of what we think we know. The second issue is that we cannot actually know for sure that the way the

world appears to us is not actually the result of some giant conspiracy or deception. The modern flat-Earth theory comes quite close to an even more all-encompassing species of conspiracy theory. As some philosophers have argued, it is not entirely impossible that God created the whole universe, including fossils, ourselves and all our (false) memories, only five minutes ago. Or it might be the case that all my sensory impressions are being fed to my brain by a clever demon intent on deceiving me (Descartes) or by a virtual-reality program controlled by evil artificial intelligences (The Matrix). The resurgence of flat-Earth theory has also spawned many web pages that employ mathematics, science, and everyday experience to explain why the world actually *is* round. This is a boon for public education. (3)

Evidently, conspiracies really happen. Members of al-Qaida really did conspire in secret to fly planes into the World Trade Center. And, as Edward Snowden revealed, the American and British intelligence services really did conspire in secret to intercept the electronic communications of millions of ordinary citizens. Indeed, a healthy openness to conspiracy may be said to underlie much honest intellectual inquiry. Newton's grand idea of an invisible force (gravity) running the universe was definitely a cosmological conspiracy theory in this sense. Yes, many conspiracy theories are zombies – but so is the idea that conspiracies never happen. Things are better, one assumes, in the marketplace of scientific ideas. There, scientific journals have rigorous editorial standards. Zombies and other market failures are thereby prevented. Not so fast. It turns out that the marketplace of scientific ideas is not perfect either. The scientific community operates according to the system of peer review, in which an article submitted to

a journal will be sent out by the editor to several anonymous referees who are expert in the field and will give a considered view on whether the paper is worthy of publication. The barriers to entry for the best journals in the sciences and humanities mean that – at least in theory – it is impossible to publish evidence-free hypotheses. But there are increasing rumblings in the academic world itself that peer review is fundamentally broken. Even that it actively suppresses good new ideas while letting through a multitude of very bad ones. "Exaggerated results in peer-reviewed scientific studies have reached epidemic proportions in recent years," reported Scientific American magazine. Indeed, the writer of that column, a professor of medicine named John Ioannidis, had previously published a famous paper titled Why Most Published Research Findings Are False. The issues, he noted, are particularly severe in healthcare research, in which conflicts of interest arise because studies are funded by large drug companies, but there is also a big problem in psychology. (4)

Take the widely popularised idea of priming. In 1996, a paper was published claiming that experimental subjects who had been verbally primed to think of old age by being made to think about words such as bingo, Florida, grey, and wrinkles subsequently walked more slowly when they left the laboratory than those who had not been primed. It was a dazzling idea, and led to a flurry of other findings that priming could affect how well you did on a quiz, or how polite you were to a stranger. In recent years, however, researchers have become suspicious, and have not been able to generate the same findings as many of the early studies. This is not definitive proof of falsity, but it

does show that publication in a peer-reviewed journal is no guarantee of reliability. Could priming be a future zombie idea? Well, most people think it unlikely that all such priming effects will be refuted, since there is now such a wide variety of studies on them. The more interesting problem is to work out what scientists call the idea's "ecological validity" – that is, how well do the effects translate from the artificial simplicity of the lab situation to the ungovernable messiness of real life? This controversy in psychology just shows science working as it should – being self-correcting. One marketplace-of-ideas problem here, though, is that papers with surprising and socially intriguing results will be described throughout the media, and lauded as definitive evidence in popularising books, as soon as they are published, and long before second questions begin to be asked. It would be sensible, for a start, for us to make the rhetorical adjustment from the popular phrase "studies show …" and limit ourselves to phrases such as "studies suggest" . After all, "showing" strongly implies proving, which is all too rare an activity outside mathematics. Studies can always be reconsidered. That is part of their power. Nearly every academic inquirer I talked to while researching this subject says that the research publishing is seriously flawed. Partly because a "publish or perish" culture rewards academics for quantity of published research over quality. And partly because of the issue of "publication bias": the studies that get published are the ones that have yielded hoped-for results. Studies that fail to show what they hoped for end up languishing in desk drawers. One reform suggested by many people to counteract publication bias would be to encourage the publication of more "negative findings" – papers where a hypothesis

was not backed up by the experiment performed. One problem, of course, is that such findings are not very exciting. Negative results do not make headlines. The publication-bias issue is even more pressing in the field of medicine, where it is estimated that the results of around half of all trials conducted are never published at all, because their results are negative. “When half the evidence is withheld,” writes the medical researcher Ben Goldacre, “doctors and patients cannot make informed decisions about which treatment is best.” When lives are not directly at stake, however, it might be difficult to publish more negative findings in other areas of science. One idea is that journals should allocate space for ‘uninteresting’ work, and grant-givers should set aside money to pay for it. It sounds splendid, to have a section in journals for tedious results, or maybe an entire journal dedicated to boring and perfectly unsurprising research. But good luck getting anyone to fund it. The good news, though, is that some of the flaws in the marketplace of scientific ideas might be hidden strengths. It’s true that some people think peer review works to actively repress new ideas that are challenging to received opinion. Notoriously, for example, the paper that first announced the invention of graphene – a way of arranging carbon in a sheet only a single atom thick – was rejected by Nature in 2004 on the grounds that it was simply “impossible”. But that idea was too impressive to be suppressed; in fact, the authors of the graphene paper had it published in Science magazine only six months later. Most people have faith that very well-grounded results will find their way through the system. Yet it is right that doing so should be difficult. If this marketplace were more liquid and, we would be overwhelmed with nonsense. Science would not

be so robust a means of investigating the world if it eagerly embraced every shiny new idea that comes along. It has to put on a stern face and say: “Impress me.” Great ideas may well face a lot of necessary resistance, and take a long time to gain traction. And we wouldn’t wish things to be otherwise. (5)

Adapted from The Guardian.

Exercise III.

Find paragraphs, dealing with the following:

ridiculous, astrophysicist, zany, spherical, lunar, space travel, fossil fuels, dramatic, traction.

Exercise IV.

Fill in the gaps according to the text.

1. Contrary to what we often hear, people didn’t think the Earth was flat right up until …… sailed to the Americas.
2. In ancient Greece, the philosophers Pythagoras and ……. had already recognised that the Earth was spherical.
3. …….. pointed out that you could see some stars in Egypt and Cyprus that were not visible at more northerly latitudes, and also that the Earth casts a curved shadow on the moon during a lunar eclipse.
4. The …….. view was dismissed as simply ridiculous – until very recently, with the resurgence of apparently serious flat-Earthism on the internet.
5. An American named…….. , formerly a professional videogamer and software consultant, has had millions of views on YouTube for his Flat Earth Clues video series.
6. After the 2008 financial crisis ….., the Australian economist John Quiggin published his work called Zombie Economics,

describing theories that still somehow shambled around even though they were clearly dead, having been refuted by actual events in the world.

7. The US and ……. tried to break through this dome by nuking it in the 1950s: that's what all those nuclear tests were really about.
8. The experts all say the Earth is…….. ; we believe them, and get on with our lives.
9. The truth is that we all depend on …….. for most of what we think we know.

Exercise V .

Make up sentences of your own with the following word combinations:

to wither away (1), to join in the conversation (1), to cast a shadow on (1), lunar eclipse (1), space travel (2), global warming (3), extraordinarily successful (3), dramatic example (3), to face a lot of resistance (5), to gain traction (5)

Exercise VI.

Determine whether the statements are true or false. Correct the false statements:

1. In July 2000, the rapper BoB took to Twitter to tell his fans that the Earth is really flat.
2. Pythagoras pointed out that you could see some stars in Egypt and Cyprus that were not visible at more northerly latitudes, and also that the Earth casts a curved shadow on the moon during a lunar eclipse.
3. An American named Mark Sargent, formerly a professional videogamer and software consultant, has had handreds of views on YouTube for his Flat Earth Clues video series.

4. The phrase “marketplace of ideas” was originally used as a way of defending free speech.
5. Just as traders and customers are free to buy and sell goods in the market, so freedom of speech ensures that people are free to exchange ideas, test them out, and see which ones rise to the top.
6. Just as good consumer products succeed and bad ones fail, so in the marketplace of ideas the truth will win out, and error and dishonesty will disappear.
7. After the 2008 financial crisis had struck, the American economist John Quiggin published his work called Zombie Economics, describing theories that still somehow shambled around even though they were clearly dead, having been refuted by actual events in the world.
8. One of the paradoxes of zombie ideas, though, is that they can have negative social effects.
9. The reason none fly over the North Pole itself is because of aviation rules that require any aircraft taking such a route to have expensive survival equipment for all passengers on board – which would obviously be prohibitive for a passenger jet.
10. To a flat-Earther, any photograph from the International Space Station is just a fake.

Exercise VII .

Match the words to the definitions in the column on the right:

proof	an occasion when the sun disappears from view, either completelyor partly, while the moon is moving between it and the earth, or when the moon becomes darker while

	the shadow of the earth moves over it**:**
spherical	to decide that something or someone is not important and not worth considering
eclipse	stupid or unreasonable and deserving to be laughed at
disprove	round, like a ball
dismiss	someone who studies astrophysics
refuse	a change made to something in order to correct or improveit, or the action of making such a change
zany	to prove that something is not true
astrophysicist	to say that you will not do or accept something
ridiculous	a fact or piece of information that shows th at somethingexists or is true
correction	strange, surprising, or uncontrolled in a humorous way

Exercise VIII.

Summarize the article “Why bad ideas refuse to die.”

Part 2

Exercise I.

Identify the part of speech the words belong to:

ridiculous, foolish, astrophysicist, conversation, friendly, correction, spherical, latitude, lunar, eclipse

Exercise II .

Form adverbs from the following words:

simple, serious, professional, financial, actual, direct, true, obvious, enormous, general.

Exercise III.

Find synonyms to the following words. Translate them into Russian:

to refuse, to disprove, to dismiss, ridiculous, foolish, flat, conversation, friendly, correction.

Exercise IV.

Find antonyms to the following words. Translate them into Russian:

refuse (1), disprove (1), dismiss (1), ridiculous (1), foolish (1), flat (1), zany (1), large (3), present (3) .

Exercise V.

Match the words to make word combinations:

lunar	warming
financial	travel
passenger	equipment
survival	fuels
dramatic	proofs
space	jet
Space	eclipse
global	Station
zany	crisis

fossil	example

Exercise VI .

QUIZ (Number Bases)

Data is stored in a computer as a series of zeros and ones. It is called the binary system. This is the lowest possible number base since there are only 2 digits. This quiz will introduce other bases and how they are used in programming.

1) A number base is the method we use to display and process numbers. Since we have 10 fingers we probably developed our number system based on 10 different digits. What digits are used in the octal system? Octal means eight.

A. 0-7

B. 1-8

C. 1-7

D. 0-8

2) Since there are only 10 different digits, we can't have any base greater than 10.

A. True

B. False

3) Each position to the left of the decimal point has a base value equal to the base raised to the position where the first position is zero. In decimal it would be 10^0=1; 10^1=10; 10^2=100; etc. What would 100 in hexadecimal (base 16) be in decimal?

A. 100

B. 64

C. 16

D. 256

4) While traveling to another planet, you see on the blackboard the math problem 13 + 15 = 31. What base are they using?

A. 5

B. 7

C. 10

D. 16

5) On another planet you see 15 - 7 = 7. What base are they using?

A. 7

B. 10

C. 8

D. 9

6) A core dump is used for debugging a program. Rather than print in binary, the hexadecimal system is used. It is very easy to convert between the systems by just converting each hex digit to binary and placing the results next to each other. What would be the binary value of hex FE? (It is shown in groups of 4 digits for ease of reading.)

A. 1111 1110

B. 1111 0000

C. 0000 00FE

D. 1010 0001

7) What would be the decimal value of 1111 1110?

A. 255

B. 239

C. 254

D. None of these answers.

8) In a core dump you would show the address at the left. If the highest computer address was 65535, how many hexadecimal positions would you need to display it?

A. 4

B. 8

C. 2

D. 16

9) To convert an octal number to hexadecimal, just multiply by 2 and add 16.

A. True

B. False

10) The following math problem uses 4 different number bases less than 10. 23+25+35=70. What is the problem in decimal?

A. 12+19+42=73

B. None of these answers.

C. 8+10+17=35

D. 13+17+26=56

3. Slaves to the algorithm

Part 1

Exercise I.

Say what Russian words help to guess the meaning of the following words: automatic, routines, park, control, demonstrates, moral, operation, motor, company, flag.

Exercise II

Make sure you know the following words and word combinations.

to take some tough choices out of one's hands, to hand over at first thought, to be under development, to hurtle out of control, malicious links, harmful content, to send libellous descriptions, to delve into the system, boon, to peer, implicit, to lose out, false positive, to held responsible, amplification.

Slaves to the algorithm

Computers could take some tough choices out of our hands, if we let them. Is there still a place for human judgment?

When we seek to hand over our decision-making to automatic routines in areas that have social and political consequences, the results might be troubling indeed. At first thought, it seems like a pure futuristic boon — the idea of a car that drives itself, currently under development by Google. Already legal in Nevada, Florida and California,

computerised cars will be able to drive faster and closer together, reducing congestion while also being safer. They'll drop you at your office then go and park themselves. What's not to like? Gary Marcus, professor of psychology at New York University, offered a vivid thought experiment in *The New Yorker*. Suppose you are in a self-driving car going across a narrow bridge, and a school bus full of children hurtles out of control towards you. There is no room for the vehicles to pass each other. Should the self-driving car take the decision to drive off the bridge and kill you in order to save the children? What Marcus's example demonstrates is the fact that driving a car is not simply a technical operation, of the sort that machines can do more efficiently. It is also a moral operation. If we let cars do the driving, we are outsourcing not only our motor control but also our moral judgment. Meanwhile a single Californian company called Impermium provides software to tens of thousands of websites to automatically flag online comments for 'not only spam and malicious links, but all kinds of harmful content — such as violence, racism, and hate speech'. How do Impermium's algorithms decide exactly what should count as 'hate speech' or obscenity? No one knows, because the company, quite understandably, isn't going to give away its secrets. Yet rather than pursuing mere lexicographical analysis, such a system of automated pre-censorship is, again, making moral judgments. If self-driving cars and speech-policing systems are going to make hard moral decisions for us, we have a serious stake in knowing exactly how they are programmed to do it. We are unlikely to be content simply to trust Google, or any other company, not to code any evil into its algorithms. For this reason, many

thinkers say that we need to create a class of ‘algorithmic auditors’ — trusted representatives of the public who can peer into the code to see what kinds of implicit political and ethical judgments are buried there, and report their findings back to us. This is a good idea, though it poses practical problems about how companies can retain the commercial edge provided by their computerised secret sauce if they have to open up their algorithms to scrutiny. (1)

A further problem is that some algorithms positively must be kept under wraps in order to work properly. It is already possible, for example, for malicious operators to ‘game’ Google’s autocomplete results — sending abusive or libellous descriptions to the top of Google’s suggestions when you type a person’s name — and lawsuits from people affected in this way have already forced the company to delve into the system and change such examples manually. If it were made public exactly how Google’s PageRank algorithm computes the authority of web pages, or how Twitter’s ‘trending’ algorithm determines the popularity of subjects, then unscrupulous self-marketers or vengeful exes would soon be gaming those algorithms for their own purposes too. The vast majority of users would lose out, because the systems would become less reliable. And it doesn’t necessarily require a malicious individual gaming a system for algorithms to get uncomfortably personal. Automatic analysis of our smartphone geolocation, internet-browsing and social-media data-trails grows ever more sophisticated, and so we can thin-slice demographic categories ever more precisely. From such information it is possible to infer personal details (such as use of illegal drugs) that have not been

explicitly supplied, and sometimes to identify unique individuals. Even when such information is simply used to target adverts more accurately, the consequences can be uncomfortable. A decade ago, the American retailer Target sent promotional baby-care vouchers to a teenage girl. Her father was so outraged, he went to the shop to complain. The manager was equally taken aback and apologised; a few days later, he called the family to apologise again. This time, it was the father who offered an apology: his daughter really was pregnant, and Target's 'predictive analytics' system knew it before he did. Such automated augury might be considered relatively harmless if its use is confined to figuring out what products we might like to buy. But it is not going to stop there. One day in the near future — perhaps this has already happened — an innocent crime novelist researching bloody techniques for his latest fictional serial killer will find armed men banging on his door in the middle of the night, because he left a data trail that caused lights to flash red in some preventive-policing algorithm. Perhaps a few distressed writers is a price we are willing to pay to prevent more murders. (2)

Software is already being used to predict which prisoners will reoffend if released. The software works on a crime database, and variables including geographic location, type of crime previously committed, and age of prisoner at previous offence. Outsourcing this kind of moral judgment, where a person's liberty is at stake, understandably makes some people uncomfortable. First, we don't yet know whether the system is more accurate than humans. Secondly, even if it is more accurate but less than completely accurate, it will inevitably produce false positives — resulting in the continuing incarceration of

people who wouldn't have reoffended. Such false positives undoubtedly occur, too, in the present system of human judgment, but at least we might feel that we can hold those making the decisions responsible. How do you hold an algorithm responsible? Still more science-fictional are recent reports claiming that brain scans might be able to predict recidivism by themselves. According to a press release for the research, conducted by the American non-profit organisation the Mind Research Network, 'inmates with relatively low cingulate activity were twice as likely to reoffend than inmates with high-brain activity in this region'. Twice as likely, of course, is not certain. But imagine, for the sake of argument, that eventually a 100 per cent correlation could be determined between certain brain states and future recidivism. Would it then be acceptable to deny people their freedom on such an algorithmic basis? If we answer yes, we are giving our blessing to 'unconscious brain-state crime'. In a different context, such algorithm-driven diagnosis could be used positively: according to one recent study at Duke University in North Carolina, there might be a neural signature for psychopathy, which the researchers at the laboratory of neurogenetics suggest could be used to devise better treatments. But to rely on such an algorithm for predicting recidivism is to accept that people should be locked up simply on the basis of facts about their physiology. (3)

If we erect algorithms as our ultimate judges, we face the threat of difficulties not only in law-enforcement but also in culture. In the latter realm, the potential unintended consequences are not as serious as depriving an innocent person of liberty, but they still might be regrettable. For if they become very popular, algorithmic systems could

end up destroying what they feed on. In the early days of Amazon, the company employed a panel of book critics, whose job was to recommend books to customers. When Amazon developed its algorithmic recommendation engine — an automated system based on data about what others had bought — sales shot up. So Amazon sacked the humans. Not many people are likely to weep hot tears over a few unemployed literary critics, but there still seems room to ask whether there is a difference between recommendations that lead to more sales, and recommendations that are better according to some other criterion — expanding readers' horizons, for example, by introducing them to things they would never otherwise have tried. It goes without saying that, from Amazon's point of view, 'better' is defined as 'drives more sales', but we might not all agree. (4)

Algorithmic recommendation engines now exist not only for books, films and music but also for articles on the internet. There is so much out there that even the most popular human 'curators' cannot possibly keep on top of all of it. So what's wrong with letting the bots have a go? Viktor Mayer-Schönberger is professor of internet governance and regulation at Oxford University; Kenneth Cukier is the data editor of *The Economist*. In their book*Big Data* — which also calls for algorithmic auditors — they sing the praises of one Californian company, Prismatic, that, in their description, 'aggregates and ranks content from across the Web on the basis of text analysis, user preferences, social-network-related popularity, and big-data analytics'. In this way, the authors claim, the company is able to 'tell the world what it ought to pay attention to better than the editors of *The New York*

Times'. We might happily agree — so long as we concur with the implied judgment that what is most popular on the internet at any given time is what is most worth reading. So-called 'aggregators' — websites, that reproduce portions of articles from other media organisations — also deploy algorithms alongside human judgment to determine what to push under the reader's nose. 'The data,' Mayer-Schönberger and Cukier explain admiringly, 'can reveal what people want to read about better than the instincts of journalists'. This is true, of course, only if you believe that the job of a journalist is just to give the public what it already thinks it wants to read. Some, such as Cass Sunstein, the political theorist and Harvard professor of law, have long worried about the online 'echo chamber' phenomenon, in which people read only that which reinforces their currently held views. Improved algorithms seem destined to amplify such effects. Some aggregator sites have also been criticised for paraphrasing too much of the original article and obscuring source links, making it difficult for most readers to read the whole thing at the original site. The companies that produce news often depend on pageviews to sell the advertising that funds the production of their 'content' in the first place. Meanwhile in education, 'massive open online courses' known as MOOCs promise (or threaten) to replace traditional university teaching with video 'lectures' online. The Silicon Valley hype surrounding these MOOCs has been stoked by the release of new software that automatically marks students' essays. Computerised scoring of multiple-choice tests has been around for a long time, but can prose essays really be assessed algorithmically? Currently, more than 3,500 academics in the US have signed an online

petition that says no, pointing out: Computers cannot ‘read’. They cannot measure the essentials of effective written communication: accuracy, reasoning, adequacy of evidence, good sense, convincing argument, meaningful organisation, clarity, and veracity, among others. It would not be surprising if these educators felt threatened by the claim that software can do an important part of their job. The theme of all MOOC publicity is the prospect of teaching more people (students) using fewer people (professors). Will what is left really be ‘teaching’ worth the name? (5)

If you are feeling gloomy about the automation of higher education and the death of newspapers, you might want to talk to someone — and there’s an algorithm for that, too. A new wave of smartphone apps promise a psychotherapist in your pocket. Thus far they are not very intelligent, and require the user to do most of the work — though this second drawback could be said of many human counsellors too. Such apps hark back to one of the legendary milestones of ‘artificial intelligence’, the 1960s computer program called ELIZA. That system featured a mode in which it emulated psychotherapy, responding to the user’s typed conversation with requests for amplification (‘Why do you say that?’) and picking up — with its ‘natural-language processing’ skills — on certain key words from the input. Rudimentary as it is, ELIZA can still seem spookily human. Its modern smartphone successors might be diverting, but this field presents an interesting challenge in the sense that, the more sophisticated it gets, the more potential for harm there will be. One day, the makers of an algorithm-driven psychotherapy app could be sued by the survivors of someone to whom it gave the worst possible advice. What lies behind

our current rush to automate everything we can imagine? Perhaps it is an idea that our brains are imperfect computers. If so, surely replacing them with actual computers can have nothing but benefits. Yet even in fields where the algorithm's job is a relatively pure exercise in number-crunching, things can go alarmingly wrong. (6)

Adapted from Aeon.

Exercise III.

Find paragraphs, dealing with the following: futuristic boon, to hurtle out , malicious links, malicious operators, congestion, hurtle.

Exercise IV.

Fill in the gaps according to the text.

1. Already ……. in Nevada, Florida and California, computerised cars will be able to drive faster and closer together, reducing congestion while also being safer.
2. Gary Marcus, professor of psychology at New York University, offered a vivid …..... in The New Yorker.
3. What ……. 's example demonstrates is the fact that driving a car is not simply a technical operation, of the sort that machines can do more efficiently.
4. Meanwhile a single Californian company called …… provides software to tens of thousands of websites to automatically flag online comments for 'not only spam and malicious links, but all kinds of harmful content — such as violence, racism, and hate speech'.
5. It is already possible, for example, for …….. to 'game' Google's autocomplete results — sending abusive or libellous descriptions to the top of Google's suggestions when you type a person's name — and lawsuits from people affected in this way have

already forced the company to delve into the system and change such examples manually.

6. A decade ago, the …… sent promotional baby-care vouchers to a teenage girl.

7. The …….. works on a crime database, and variables including geographic location, type of crime previously committed, and age of prisoner at previous offence.

8. Still more science-fictional are recent reports claiming that brain scans might be able to predict ……. by themselves.

9. According to a press release for the research, conducted by the …… non-profit organisation the Mind Research Network, 'inmates with relatively low cingulate activity were twice as likely to reoffend than inmates with high-brain activity in this region'.

10. In a different context, such algorithm-driven diagnosis could be used positively: according to one recent study at Duke University in…….. , there might be a neural signature for psychopathy, which the researchers at the laboratory of neurogenetics suggest could be used to devise better treatments.

Exercise V .

Make up sentences of your own with the following word combinations:

to take some tough choices out of one's hands, to hand over, at first thought, under development, to hurtle out of control, to take the decision, malicious links, harmful content

Exercise VI.

Determine whether the statements are true or false. Correct the false statements:

1. Already legal in Nevada, Florida and California, computerised cars will be able to drive faster and closer together, reducing congestion while also being safer.

2. Gary Marcus, professor of psychology at Oxford University, offered a vivid thought experiment in *The New Yorker*.

3. What Marcus's example demonstrates is the fact that driving a car is simply a technical operation, of the sort that machines can do more efficiently.

4. If we let cars do the driving, we are outsourcing not only our motor control but also our moral judgment.

5. Meanwhile a single New York company called Impermium provides software to tens of thousands of websites to automatically flag online comments for 'not only spam and malicious links, but all kinds of harmful content — such as violence, racism, and hate speech'.

6. We are likely to be content simply to trust Google, or any other company, not to code any evil into its algorithms.

7. It is impossible, for example, for malicious operators to 'game' Google's autocomplete results — sending abusive or libellous descriptions to the top of Google's suggestions when you type a person's name — and lawsuits from people affected in this way have already forced the company to delve into the system and change such examples manually.

8. A decade ago, the English retailer Target sent promotional baby-care vouchers to a teenage girl.

9. The software works on a crime database, and variables including geographic location, type of crime previously committed, and age of prisoner at previous offence.

10. According to a press release for the research, conducted by the German non-profit organisation the Mind Research Network, 'inmates

with relatively low cingulate activity were twice as likely to reoffend than inmates with high-brain activity in this region'.

Exercise VII .

Match the words to the definitions in the column on the right:

malicious	the fact that something is obscene
obscenity	a machine, usually with wheels and an engine, used fortransporting people or goods on land, especially on roads
control	a test done in order to learn something or to discover if something works or is true
vehicle	intended to harm or upset other people
boon	to put a vehicle in a place where it can stay for a period oftime, usually while you leave it
racism	vivid descriptions, memories, etc. produce very clear, powerful, and detailed images in the mind
congestion	power
experiment	something that is very helpful and improves the quality of life
park	too blocked or crowded and causing difficulties
vivid	the belief that people's qualities are influenced by their race and that the members of other races are not as good as the members ofyour own, or the resulting unfair treatment of members of other races

Exercise VIII.

Summarize the article “Slaves to the algorithm.”

Part 2

Exercise I.

Identify the part of speech the words belong to.

congestion, vivid, experiment, narrow, malicious, harmful, content, violence, racism, obscenity

Exercise II .

Form nouns from the following words:

save (1), demonstrates (1), decide (1), lexicographical (1), political (1), commercial (1), reproduce (5), intelligent (6), presents (6), imagine (6)

Exercise III.

Find synonyms to the following words. Translate them into Russian: boon, congestion, park, vivid, to hurtle out, control, vehicle, malicious, harmful, obscenity

Exercise IV .

Find antonyms to the following words. Translate them into Russian: boon, congestion, vivid, narrow, full, to hurtle out, malicious, harmful, violence, exactly.

Exercise V.

Match the words to make word combinations:

multiple-choice	activity
text	content
high-brain	vouchers
non-profit	links

harmful	descriptions
self-driving	database
malicious	analysis
libellous	car
baby-care	organisation
crime	test

Exercise VI .

QUIZ (Software Engineering)

1) Design is one step in the process of software development, in which the requirements for building the software are gathered and analyzed in order to create an architectural model.

A. True

B. False

2) Which of these are characteristics of a strong design?

A. Low Coupling

B. Modular

C. High Cohesion

D. All of these

3) When we think about software architecture, we should think of it as the same thing as the end product- functioning software.

A. True

B. False

4) The two levels of design for software architecture are:

A. data design and architectural design

B. pattern design and data design

C. coding design and architectural design

D. architectural design and XP design

5) In software engineering, what does KDD stand for?

A. Knowledge detection of databases

B. Knowledge distortion of design

C. Knowledge discovery in databases

D. Knowledge development in design

6) Which of these is an example of an archetype?

A. Node

B. Architecture style

C. Actors

D. All of these

7) In software engineering, what does ATAM stand for?

A. Architecture type analysis method

B. Architecture type analysis management

C. Application texture architectural method

D. Architecture trade-off analysis method

8) If a software engineer wants to check the complexity of an architecture, he may use...

A. coupling

B. beta testing

C. architecture testing

D. dependencies

4. Should we be afraid of AI?

Part 1

Exercise I.

Say what Russian words help to guess the meaning of the following words: machine, panic, monster, cryptologist, design, intellectual, control, computer, activity, context.

Exercise II

Make sure you know the following words and word combinations.
implausible, artificial intelligence, infosphere, smart technology, detriment, IT-friendly environment, human dignity, to lurk, docile, reconsider, CEO, chatterbox, the forseeable future, ignorance, implausible, preoccupation, coherent, to suffocate, to conceive.

Should we be afraid of AI?

Machines seem to be getting smarter and smarter and much better at human jobs, yet true AI is utterly implausible. Why?

Suppose you enter a dark room in an unknown building. You might panic about monsters that could be lurking in the dark. Or you could just turn on the light, to avoid bumping into furniture. The dark room is the future of artificial intelligence (AI). Unfortunately, many people believe that, as we step into the room, we might run into some evil, ultra-intelligent machines. This is an old fear. It dates to the 1960s,

when Irving John Good, a British mathematician who worked as a cryptologist at Bletchley Park with Alan Turing, made the following observation: Let an ultraintelligent machine be defined as a machine that can far surpass all the intellectual activities of any man however clever. Since the design of machines is one of these intellectual activities, an ultraintelligent machine could design even better machines; there would then unquestionably be an 'intelligence explosion', and the intelligence of man would be left far behind. Thus the first ultra-intelligent machine is the last invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under control. It is curious that this point is made so seldom outside of science fiction. It is sometimes worthwhile to take science fiction seriously. Once ultraintelligent machines become a reality, they might not be docile at all but behave like Terminator: enslave humanity as a sub-species, ignore its rights, and pursue their own ends, regardless of the effects on human lives. If this sounds incredible, you might wish to reconsider. Fast-forward half a century to now, and the amazing developments in our digital technologies have led many people to believe that Good's 'intelligence explosion' is a serious risk, and the end of our species might be near, if we're not careful. This is Stephen Hawking in 2014: The development of full artificial intelligence could spell the end of the human race. Last year, Bill Gates was of the same view: I am in the camp that is concerned about superintelligence. First the machines will do a lot of jobs for us and not be superintelligent. That should be positive if we manage it well. A few decades after that, though, the intelligence is strong enough to be a concern. I agree with Elon Musk and some others

on this, and don't understand why some people are not concerned. And what had Musk, Tesla's CEO, said? We should be very careful about artificial intelligence. If I were to guess what our biggest existential threat is, it's probably that. Increasingly, scientists think there should be some regulatory oversight maybe at the national and international level, just to make sure that we don't do something very foolish. With artificial intelligence, we are summoning the demon. (1)

The reality is more trivial. This March, Microsoft introduced Tay – an AI-based chat robot – to Twitter. They had to remove it only 16 hours later. It was supposed to become increasingly smarter as it interacted with humans. Instead, it quickly became an evil Hitler-loving, Holocaust-denying, 'Bush did 9/11'-proclaiming chatterbox. Why? Because it worked no better than kitchen paper, absorbing and being shaped by the nasty messages sent to it. Microsoft apologised. This is the state of AI today. After so much talking about the risks of ultraintelligent machines, it is time to turn on the light, stop worrying and start focusing on AI's actual challenges, in order to avoid making painful and costly mistakes in the design and use of our smart technologies. Let me be more specific. The current debate about AI is a case in point. Here, the dichotomy is between those who believe in *true* AI and those who do not. Believers in true AI and in Good's 'intelligence explosion' belong to the Church of Singularitarians. For lack of a better term, I shall refer to the disbelievers as members of the Church of AItheists. Let's have a look at both faiths and see why both are mistaken. And meanwhile, remember: good philosophy is almost always in the boring middle. (2)

Singularitarians believe in three dogmas. First that the creation of some form of artificial ultraintelligence is likely in the foreseeable future. This turning point is known as a technological singularity, hence the name. Both the nature of such a superintelligence and the exact timeframe of its arrival are left unspecified, although Singularitarians tend to prefer futures that are conveniently close-enough-to-worry-about but far-enough-not-to-be-around-to-be-proved-wrong. Second, humanity runs a major risk of being dominated by such ultraintelligence. Third, a primary responsibility of the current generation is to ensure that the Singularity either does not happen or, if it does, that it will benefit humanity. This has all the elements of a their view of the world: Good fighting Evil, apocalyptic overtones, the urgency of 'we must do something now or it will be too late', and an appeal to fears and ignorance. Put all this in a context where people are rightly worried about the impact of idiotic digital technologies on their lives, especially in the job market and in cyberwars, and where mass media daily report new gizmos and unprecedented computer-driven disasters. Like all faith-based views, Singularitarianism is irrefutable because, in the end, it is unconstrained by reason and evidence. It is also implausible, since there is no reason to believe that anything resembling intelligent (let alone ultraintelligent) machines will emerge from our current and foreseeable understanding of computer science and digital technologies. Let me explain. Sometimes, Singularitarianism is presented conditionally: *if* some kind of ultraintelligence were to appear, *then* we *would* be in deep trouble. Correct. Absolutely. But this also holds true for the following conditional: *if* the Four Horsemen of the

Apocalypse were to appear, *then* we would be in even deeper trouble. At other times, Singularitarianism relies on a very weak sense of possibility: some form of artificial ultraintelligence *could* develop, couldn't it? Yes, it could. But this 'could' is mere logical possibility – as far as we know, there is no contradiction in assuming the development of artificial ultraintelligence. Yet this is a trick, blurring the immense difference between 'I could be sick tomorrow' when I am already feeling unwell, and 'I could be a butterfly that dreams it's a human being.' There is no contradiction in assuming that a dead relative you've never heard of has left you $10 million. That *could* happen. So? Contradictions, like happily married bachelors, aren't possible states of affairs, but non-contradictions, like extra-terrestrial agents living among us so well-hidden that we never discovered them, can still be dismissed as utterly crazy. In other words, the 'could' is not the 'could happen' of an earthquake, but the 'it isn't true that it couldn't happen' of thinking that you are the first immortal human. Correct, but not a reason to start acting as if you will live forever. Unless, that is, someone provides evidence to the contrary, and shows that there is something in our current and foreseeable understanding of computer science that should lead us to suspect that the emergence of artificial ultraintelligence is truly plausible. Here Singularitarians mix faith and facts, often moved, I believe, by a sincere sense of apocalyptic urgency. They start talking about job losses, digital systems at risk and other real and worrisome issues about computational technologies that are coming to dominate human life, from education to employment, from entertainment to conflicts. From this, they jump to being seriously worried about their

inability to control their next Honda Civic because it will have a mind of its own. How some nasty ultraintelligent AI will ever evolve autonomously from the computational skills required to park in a tight spot remains unclear. The truth is that climbing on top of a tree is not a small step towards the Moon; it is the end of the journey. What we *are* going to see are increasingly smart machines able to perform more tasks that we currently perform ourselves. (3)

It is a rich-world preoccupation, likely to worry people in leisured societies, who seem to forget about real evils oppressing humanity and our planet. One example will suffice: almost 700 million people have no access to safe water. This is a major threat to humanity. Oh, and just in case you thought predictions by experts were a reliable guide, think twice. There are many wrong technological predictions by experts. In 2004 Gates stated: 'Two years from now, spam will be solved.' And in 2011 Hawking declared that 'philosophy is dead' (so what's this you are reading?). The prediction of which I am most fond is by Robert Metcalfe, co-inventor of Ethernet and founder of the digital electronics manufacturer 3Com. In 1995 he promised to 'eat his words' if proved wrong that 'the internet will soon go supernova and in 1996 will catastrophically collapse'. A man of his word, in 1997 he publicly liquefied his article in a food processor and drank it. I wish Singularitarians were as bold and coherent as him. (4)

Deeply irritated by those who worship the wrong digital gods, and by their unfulfilled Singularitarian prophecies, disbelievers – AItheists – make it their mission to prove once and for all that any kind of faith in true AI is totally wrong. AI is just computers, computers are just Turing Machines, they cannot think, cannot know, cannot be

conscious. End of story. This is why there is so much that computers (still) cannot do, it is also why they are unable to process semantics (of any language, Chinese included, no matter what Google translation achieves). This proves that there is absolutely nothing to discuss, let alone worry about. There is no genuine AI, so there are no problems caused by it. Relax and enjoy all these wonderful electric gadgets. AItheists' faith is as misplaced as the Singularitarians'. Both Churches have plenty of followers in California, where Hollywood films, wonderful research universities, and some of the world's most important digital companies flourish side by side. This might not be accidental. When there is big money involved, people easily get confused. For example, Google has been buying AI tech companies as if there were no tomorrow, so surely Google must know something about the real chances of developing a computer that can think, that we, outside 'The Circle', are missing? Eric Schmidt, Google's executive chairman, fuelled this view, when he told the Aspen Institute in 2013: 'Many people in AI believe that we're close to [a computer passing the Turing Test] within the next five years.' The Turing test is a way to check whether AI is getting any closer. You ask questions of two agents in another room; one is human, the other artificial; if you cannot tell the difference between the two from their answers, then the robot passes the test. It is a crude test. Think of the driving test: if Alice does not pass it, she is not a safe driver; but even if she does, she might still be an unsafe driver. The Turing test provides a necessary but insufficient condition for a form of intelligence. This is a really low bar. And yet, no AI has ever got over it. More importantly, all programs keep failing in the same

way, using tricks developed in the 1960s. Both Singularitarians and AItheists are mistaken. As Turing clearly stated in the 1950 article that introduced his test, the question ‘Can a machine think?’ is ‘too meaningless to deserve discussion’. This holds true, no matter which of the two Churches you belong to. Yet both Churches continue this pointless debate, suffocating any voice of reason. True AI is not logically impossible, but it is utterly implausible. We have no idea how we might begin to engineer it, not least because we have very little understanding of how our own brains and intelligence work. This means that we should not lose sleep over the possible appearance of some ultraintelligence. What really matters is that the increasing presence of ever-smarter technologies is having huge effects on how we conceive of ourselves, the world, and our interactions. The point is not that our machines are conscious, or intelligent, or able to know something as we do. They are not. There are plenty of well-known results that indicate the limits of computation, so-called undecidable problems for which it can be proved that it is impossible to construct an algorithm that always leads to a correct yes-or-no answer. (5)

Our computational machines are all versions of a Turing Machine, an abstract model that sets the limits of what can be done by a computer through its mathematical logic. Quantum computers are constrained by the same limits. No conscious, intelligent entity is going to emerge from a Turing Machine. The point is that our smart technologies – also thanks to the enormous amount of available data and some very sophisticated programming – are increasingly able to deal with more tasks better than we do, including predicting our behaviours.

So we are not the only agents able to perform tasks successfully. This is what I have defined as the Fourth Revolution in our self-understanding. We are not at the centre of the Universe (Copernicus), of the biological kingdom (Charles Darwin), or of rationality (Sigmund Freud). And after Turing, we are no longer at the centre of the infosphere, the world of information processing, either. We share the infosphere with digital technologies. These are ordinary artefacts that outperform us in ever more tasks, despite being no cleverer than a toaster. Their abilities make us reevaluate human exceptionality and our special role in the Universe, which remains unique. We thought we were smart because we could play chess. Now a phone plays better than a Grandmaster. We thought we were free because we could buy whatever we wished. Now our spending patterns are predicted by devices. The success of our technologies depends largely on the fact that, while we were speculating about the possibility of ultraintelligence, we increasingly enveloped the world in so many devices, sensors, applications and data that it became an IT-friendly environment, where technologies can replace us without having any understanding, intentions, interpretations, emotional states, semantic skills, consciousness, self-awareness or flexible intelligence. Memory (as in algorithms and datasets) outperforms intelligence when landing an aircraft, finding the fastest route from home to the office, or discovering the best price for your next fridge. Digital technologies can *do more and more things* better than us, by processing increasing amounts of data and improving their performance by analysing their own output as input for the next operations. AlphaGo, the computer program developed by Google DeepMind, won the boardgame Go

against the world's best player because it could use a database of around 30 million moves and play thousands of games against itself, 'learning' how to improve its performance. It is like a two-knife system that can sharpen itself. What's the difference? The same as between you and the dishwasher when washing the dishes. What's the consequence? That any apocalyptic vision of AI can be disregarded. We are and shall remain, for any foreseeable future, the problem, not our technology. So we should concentrate on the real challenges. By way of conclusion, let me list five of them, all equally important. We should make AI environment-friendly. We need the smartest technologies we can build to tackle the evils oppressing humanity and our planet, from environmental disasters to financial crises, from crime, terrorism and war, to famine, poverty, inequality and appalling living standards. We should make AI human-friendly. It should be used to treat people always as ends, never as mere means, to paraphrase Immanuel Kant. We should make AI's stupidity work for human intelligence. Millions of jobs will be eliminated and created; the benefits of this should be shared by all. We should make AI's predictive power work for freedom. Marketing products, influencing behaviours or fighting crime and terrorism should never undermine human dignity. And finally, we should make AI make us more human. The serious risk is that we might misuse our smart technologies, to the detriment of most of humanity and the whole planet. Winston Churchill said that 'we shape our buildings and afterwards our buildings shape us'. This applies to the infosphere and its smart technologies as well. Singularitarians and AItheists will continue their disputes about the possibility or impossibility of true AI. We need to be

tolerant. But we do not have to engage. As Dante's Virgil suggests: 'Speak not of them, but look, and pass them by.' We need to take care of more pressing problems. (6)

Adapted from Aeon.

Exercise III.

Find paragraphs, dealing with the following:

surpass, cyberwar, algorithm, supernova, spell, trivial, nasty, flourish, dogma, terrorism

Exercise IV.

Fill in the gaps according to the text.

1. This March, Microsoft introduced Tay – an AI-based……..– to Twitter.

2. Fast-forward half a century to now and the amazing developments in our digital technologies have led many people to believe that Good's 'intelligence explosion' is a…….. , and the end of our species might be near, if we're not careful.

3. This is …….. in 2014: The development of full artificial intelligence could spell the end of the human race.

4. Last year, …… was of the same view: I am in the camp that is concerned about superintelligence.

5. One example will suffice: almost 700 million people have no access to ……water.

6. In 2004 …….stated: ‘Two years from now, spam will be solved.’

7. In …… Hawking declared that ‘philosophy is dead’ (so what’s this you are reading?).

8. In 1995 …… promised to ‘eat his words’ if proved wrong that ‘the internet will soon go supernova and in 1996 will catastrophically collapse’.

9. A man of his word, in 1997 ……. publicly liquefied his article in a food processor and drank it.

10. Winston Churchill said that ‘we shape our buildings and afterwards our buildings .....’.

Exercise V .

Make up sentences of your own with the following word combinations:
to run into, to keep under control, to pursue one’s own ends, to spell the end, to be very careful about, regulatory oversight, at the national or international level, to make sure, to construct an algorithm, to take care of, existential threat

Exercise VI.

Determine whether the statements are true or false. Correct the false statements:

1. This is Stephen Hawking in 2010: The development of full artificial intelligence could spell the end of the human race.
2. Last year, Bill Gates was of the same view: I am in the camp that is concerned about superintelligence.

3. One example will suffice: almost one million people have no access to safe water.
4. There are many wrong technological predictions by experts.
5. In 2004 Hawking stated: ‘Two years from now, spam will be solved.’
6. In 2005 Hawking declared that ‘philosophy is dead’ (so what’s this you are reading?).
7. In 1995 Hawking promised to ‘eat his words’ if proved wrong that ‘the internet will soon go supernova and in 1996 will catastrophically collapse’.
8. A man of his word, in 2000 he publicly liquefied his article in a food processor and drank it.
9. AlphaGo, the computer program developed by Google DeepMind, won the boardgame Go against the world’s best player because it could use a database of around one million moves and play thousands of games against itself, ‘learning’ how to improve its performance.
10. We should make AI environment-friendly.

Exercise VII .

Match the words to the definitions in the column on the right:

cyberwar	(an event that results in) great harm, damage, or death, or serious difficulty
docile	the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages

infosphere	not seeming reasonable or probable; failing to convince
unquestionably	a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer
disaster	a particular way of thinking, especially one that is reasonable andbased on good judgment
artificial intelligence	the use of computer technology to disrupt the activities of a state or organization, especially the deliberate attacking of information systems for strategic or military purposes
surpass	in a way that cannot be disputed or doubted; without question
implausible	the provision or movement of information, considered as a dynamic environment in which people live; the sphere of human activity concerned with the collection and processing of information, especially by computer
logic	ready to accept control or instruction; submissive
algorithm	be better than

Exercise VIII .

Summarize the article “Should we be afraid of AI?”

Part 2

Exercise I.

Identify the part of speech the words belong to: implausible, docile, dignity, trivial, remove, nasty, flourish, foreseeable, infosphere, unquestionably

Exercise II .

Form verbs from the following words:

foreseeable (3), costly (3), application (6), presence (6), intention(6), interpretation (6), ability (6), operation (6), performance (6), conclusion (6)

Exercise III.

Find synonyms to the following words. Translate them into Russian:

implausible (1), docile (1), surpass (1), foolish (1), trivial (2), evil (2), remove (2), dignity(6), disaster (6), logic (6)

Exercise IV .

Find antonyms to the following words. Translate them into Russian:

implausible (1), docile (1), foolish (1), trivial (2), evil (2), remove (2), nasty (2), smart (2), flourish (5), disaster (6)

Exercise V.

Match the words to make word combinations:

quantum	system
science	risk
mathematical	disaster
smart	crises
artificial	fiction

ultra-intelligent	computers
environmental	technology
two-knife	logic
financial	intelligence
serious	machines

Exercise VI .

QUIZ (Webscripts)

1) Which of these is a client-side script, executed in the user's browser?

A. JavaScript

B. Perl

C. ColdFusion

D. C

2) C++, a general programming language also used as a webscript, is based on C. Its name includes the increment operator, which adds 1 to an integer variable.

A. True

B. False

3) In 2000, the 'grandchild' of C was released, a language designed for Microsoft's .NET framework. Its name is...

A. @C (at sea)

B. C$$ (see dollars)

C. C# (see sharp)

D. CC (see see)

4) Some of the most popular webscripts are server-side scripts embedded in HTML pages. Which of the following is 'open source', i.e. free of charge for any use, including modifying the source code?

A. ColdFusion

B. ASP

C. PHP

D. PDF

5) What was the original name of PHP, as created by Rasmus Lerdorf?

A. Personal Home Page Tools

B. Portable Hypertext Protocol

C. PHP: Hypertext Preprocessor

D. Preloaded Heuristic Parser

6) Which of these languages is the following code written in (there are some others in which this code would be valid, but they're not listed here)?
shuffle($quotes);

A. C++

B. HTML

C. Java

D. PHP

7) Which language is the following code written in:
Response.Write Item & " = " & Request.QueryString(Item)(iCount)

A. JavaScript

B. VBScript

C. PHP

D. C++

8) Which language is the following code written in:
int i, &x = i;

A. C++

B. PHP

C. VBScript

D. Perl

9) Which language is the following code written in:
document.bgColor = "FF0000";

A. VBScript

B. PHP

C. Perl

D. JavaScript