

英語 - I

次の文章に関して、空欄補充問題と読解問題の二つがあります。まず、[31]から[40]の空所を埋めるのに、文脈的に最も適切な語を1から3の中から選び、その番号を解答欄(31)から(40)にマークしなさい。次に、内容に関する[41]から[45]の設問には、1から4の選択肢が付されています。そのうち、文章の内容からみて最も適切なものを選び、その番号を解答欄(41)から(45)にマークしなさい。

- 1 A self-driving car carrying a family of four on a rural two-lane highway spots a bouncing ball ahead. As the vehicle approaches, a child runs out to retrieve the ball. Should the car risk its passengers' lives by swerving to the side—where the edge of the road meets a steep cliff? Or should the car continue on its path, ensuring its passengers' safety at the child's expense? This scenario and many others pose moral and ethical dilemmas that carmakers, car buyers, and regulators must address before vehicles should be given full autonomy, according to a study published in *Science*.
- 2 The study highlights paradoxes facing carmakers, car buyers, and regulators as driverless technology [31](1. stagnates 2. declines 3. accelerates). Most of the 1,928 research participants in the *Science* report indicated that they believed vehicles should be programmed to crash into something rather than run over pedestrians, even if that meant killing the vehicle's passengers. "The algorithms that control autonomous vehicles will need to [32](1. revise 2. ignore 3. embed) moral principles guiding their decisions in situations of unavoidable harm," according to the authors.
- 3 Yet many of the same study participants [33](1. agreed with 2. balked at 3. played up) the idea of buying such a vehicle, preferring to ride in a driverless car that prioritizes their own safety above that of pedestrians. The researchers concluded that if lawmakers were to prioritize pedestrians over passengers when [34](1. designing 2. manufacturing 3. regulating) self-driving vehicles, people would be less likely to buy those vehicles. A shrinking market for driverless cars would slow their development despite research showing that autonomous vehicles could potentially reduce traffic, cut pollution, and save thousands of lives each year—human error [35](1. contributes to 2. prevents 3. stems from) 90 percent of all traffic accidents.
- 4 The researchers based their survey queries largely on an ethics thought experiment known as "the trolley problem." There are several variations on the trolley problem but they mostly pose [36](1. historical 2. hypothetical 3. realistic) scenarios in which a trolley is on course to run over a group of people. A person watching the events unfold must choose between an intervention that sacrifices one person for the good of the group or one that protects an individual at the expense of the group.

5 Some observers say a key flaw in the *Science* study is that it does not take into account how the artificial intelligence (AI) being developed to control driverless vehicles actually works. “This question of ethics has become a popular topic with people who don’t work on the technology,” says Ragnathan Rajkumar, a professor of electrical and computer engineering at Carnegie Mellon University. “AI does not have the same cognitive capabilities that we as humans have,” he adds.

6 Instead, autonomous vehicles make decisions based on speed, weather, road conditions, distance, and other data gathered by a variety of sensors, including cameras and radar. A driverless car will calculate a [37](1. course 2. cost 3. thread) of action based on how fast it is traveling as well as the speed of an object in its path, for example. The main challenge is in gathering and processing the necessary data quickly enough to avoid dangerous circumstances in the first place. Rajkumar acknowledges that this will not always be possible but he is [38](1. confident 2. skeptical 3. adamant) that in such cases it will come down to the vehicle essentially deciding who lives and who dies.

7 The study authors [39](1. almost 2. likewise 3. barely) acknowledge that their discussion of driverless vehicle moral dilemmas is a work in progress. They launched a Web site called Moral Machine to help gather more information about how people would prefer autonomous cars to react in different scenarios where passenger and pedestrian safety are [40](1. in alignment 2. at odds 3. unrelated). The site lets participants compare their responses and even offers the ability to construct new scenarios by tinkering with the number and type of people involved and whether they are obeying traffic laws at the time of the accident.

—Based on Greenemeier, L. (n.d.). *Scientific American*.

[41] Which of the following most likely represents the opinion of the researchers?

1. Self-driving cars will improve road safety.
2. Self-driving cars are too dangerous to be legal.
3. The market for self-driving cars is small.
4. Humans cannot be trusted with self-driving cars.

[42] Which of the following is an example of the “trolley problem?”

1. A group of people on a life raft with too many people must vote on which person must get out in order to keep the raft afloat.
2. Firefighters must choose between rescuing a famous scientist from the 4th floor of a burning research building or rescue her students from the 1st floor.
3. An airline pilot must choose between making an emergency landing on a highway with many cars on it or an unoccupied river.
4. Members of a jury must decide on whether a murderer should spend his life in prison, or receive the death penalty.

[43] Which of the following most likely represents Ragnathan Rajkumar’s opinion on ethics in artificial intelligence (AI)?

1. AI researchers must be careful to program good ethics into their machines.
2. AI technology will make the study of ethics obsolete.
3. The decisions of AI are always the most ethical by design.
4. Ethics are not considered in the decisions made by AI technologies.

[44] According to the 6th paragraph, which of the following problems facing driverless cars is the most important?

1. Regulatory hurdles.
2. Technological development.
3. Moral quandaries.
4. Social acceptance.

[45] Which of the following would be the best title for this article?

1. The Future is Bright for Driverless Cars
2. Flawed Understanding of AI Abounds
3. Driverless Cars Will Face Moral Dilemmas
4. The Trolley Problem’s Move to Cars

英語 - II

次の文章に関して、空欄補充問題と読解問題の二つがあります。まず、[46]から[55]の空所を埋めるのに、文脈的に最も適切な語を1から3の中から選び、その番号を解答欄(46)から(55)にマークしなさい。次に、内容に関する[56]から[60]の設問には、1から4の選択肢が付されています。そのうち、文章の内容からみて最も適切なものを選び、その番号を解答欄(56)から(60)にマークしなさい。

- 1 When they hear “biofuel,” people tend to assume you’re talking about corn. That makes sense, given that corn is anticipated to provide 80 percent of this year’s ethanol production—much more, say, than algae—until we consider a few numbers.
- 2 By all accounts, microalgae* is less land-intensive than corn production, and although it can pull double duty, providing high-quality feed for fish farms, it doesn’t compete with food crops. [46](1. Furthermore 2. Nonetheless 3. Even so), even by the largely pro-corn Renewable Fuel Association’s (RFA) water-consumption standards, corn ethanol is a thirsty fuel: Drinking 2.8 gallons of water for every gallon of fuel refined, corn is often outclassed in efficiency by algae-based fuels.
- 3 Algae biofuel frontrunner Algenol, for example, converts plentiful saltwater into biofuel with yields nearly 17 times higher than those of corn, while producing 1.4 gallons of fresh water per every gallon of fuel produced. But simple consumption comparisons between corn and aquatic fuels are often [47](1. apples-to-oranges 2. carrots-to-sticks 3. coins-to-cats) affairs at best. Much like the RFA’s figure, which ignores that growing an ethanol-gallon’s worth of corn costs 1,145 gallons of water, these simplistic metrics often miss something fundamental: Corn biofuel production consumes land, fertilizers, and water, whereas algae biofuel production can filter water, recycle runoff, and improve emissions.
- 4 John Decicco, a research professor at the University of Michigan Energy Institute, has debunked this misleading appraisal of corn perhaps better than anyone else. He notes that the change in emissions in choosing corn ethanol over gas was “insignificant at best,” and sometimes up to 70 percent worse. This [48](1. benefit 2. deficiency 3. innovation) is largely thanks to the chemical breakdown of agricultural fertilizers trapped in soil, and the energy-intensive filtering of those that become runoff.
- 5 And [49](1. thereafter 2. thereby 3. therein) lies a fundamental difference between corn and aquatic biofuel platforms. Looking only at the former, you’d walk away with the impression that biofuel must consume extravagant resources for, at best, a mediocre improvement over gas. When you look at the latter you see how industrial pollution, CO₂, and runoff-laden wastewater can be recycled into fuel and new fertilizer.

6 But if aquatic fuels are really such a comparatively comprehensive solution, why are we still so
[50](1. amused by 2. obsessed with 3. threatened by) corn biofuels?

7 The old argument would be that aquatic fuels aren't yet commercially ready, that costs and
yields simply aren't there yet. But that story no longer [51](1. sticks 2. holds 3. makes) up.
Simply put, when faced with a growing list of algae-based platforms boasting well-tested estimate
yields up to 2.8 times that of corn, and 32 to 70 percent fewer emissions than gas, corn looks
increasingly weak.

8 And microalgae is far from the only aquatic flora against which corn seems like a one-trick
pony.

9 Macroalgae, or kelp, is a marine biofuel source promising some benefits that outstrip even its
single-celled cousin. [52](1. Along with 2. Similar to 3. Unlike) terrestrial corn monocultures,
kelp—cultivated or otherwise—grows into aquatic forests. In essence, the kelp farms that would
fuel a marine biofuel industry would also form the foundation of a functioning ecosystem—one that
filters pollution and sequesters 6.7 tons of carbon per acre.

10 On the freshwater front, prolific floating plants are also gaining credibility as a candidate for
wastewater-to-biofuel refineries looking to [53](1. cater to 2. prey upon 3. take in) small
communities. The frontrunner of this movement, duckweed, has the ability to rapidly trap
water-borne nutrients and double its growth in as [54](1. slowly 2. much 3. little) as two days. As
of this year, duckweed will see its most notable commercial venture yet: a refinery in Georgia, with an
estimated per-acre yield double that of corn.

11 Aquatic farms and ecosystems are simply more productive than terrestrial monocultures. So
once again, perhaps it's worth asking why we still associate biofuel with its most [55](1. old-fashioned
2. newfangled 3. optimistic) manifestation.

12 Biofuel remains a stepping stone to better solutions—and aquatic biofuel remains more
promising than corn.

Note:

*microalgae: 微細藻類.

—Based on Graber-Stiehl, I. (2016, July 12). The future of biofuel isn't corn—It's algae. *Pacific Standard*.

[56] What is meant in the 2nd paragraph by the claim that microalgae can “pull double duty”?

1. It is twice as efficient as corn.
2. There are two kinds of microalgae.
3. It is half as big as corn.
4. It can be used for fuel and food.

[57] Which of the following is the main point the article is trying to make in the 2nd through 5th paragraphs?

1. Algae is cheaper than corn.
2. Algae produces more powerful fuel than corn.
3. Algae is more environmental than corn.
4. Algae is more popular than corn.

[58] Which of the following is meant in the 7th paragraph by the claim that “costs and yields simply aren’t there yet”?

1. It is not possible to know how much it will cost or produce.
2. The research on costs and yields is ongoing.
3. It is still too expensive and inefficient.
4. It is not well-suited to all locations.

[59] Which of the following is meant by the phrase “its single-celled cousin” in the 9th paragraph?

1. Microalgae.
2. Corn.
3. Duckweed.
4. Kelp.

[60] Which of the following is meant by the phrase “biofuel remains a stepping stone to better solutions” in the final sentence?

1. Algae is a better biofuel than corn.
2. Biofuels will be inferior to future technologies.
3. Biofuels have not improved in a long time.
4. Corn is an impediment to producing better biofuels.

英語 - III

次の文章に関して、空欄補充問題と読解問題の二つがあります。まず、[61]から[80]の空所を埋めるのに、文脈的に最も適切な語を1から3の中から選び、その番号を解答欄(61)から(80)にマークしなさい。次に、内容に関する[81]から[90]の設問には、1から4の選択肢が付されています。そのうち、文章の内容からみて最も適切なものを選び、その番号を解答欄(81)から(90)にマークしなさい。

- 1 During his three controversial terms as mayor of New York, Michael Bloomberg launched all-out public-health crusades against some of his constituents' favorite vices, including cigarettes, trans fats, and sodas. Perhaps he should have declared war on loneliness instead. Scientists have repeatedly found that people who lack—or believe that they lack—close social connections have significantly higher mortality rates than those who find themselves surrounded by friends. One 2010 review of previous studies suggested that social isolation may be more dangerous than obesity and just as deadly as smoking. Loneliness and isolation appear to alter hormone levels, immune responses, and gene expression, and to increase the risk for a variety of [61](1. elements 2. ailments 3. alignments), including heart disease, depression, high blood pressure, and Alzheimer's.
- 2 Humans are not the only creatures that benefit from a little companionship; isolation can also [62](1. empower 2. enfeeble 3. eliminate) rats, mice, pigs, rabbits, squirrel monkeys, starlings, and parrots. And it takes a particular toll on *Camponotus fellah*, a [63](1. species 2. specialization 3. specimen) of carpenter ant. According to a new study by researchers at the University of Lausanne, in Switzerland, worker ants that live alone have one-tenth the life [64](1. measurement 2. quantity 3. span) of those that live in small groups. Scientists have known for decades that social insects fare poorly when [65](1. connected to 2. separated from 3. relocated in) their colonies, and the Swiss group, in the course of their ongoing experiments with carpenter ants, had observed this effect firsthand. “We realized that, when we isolated them, many of them would die quickly, even if we provided them with food and water,” Laurent Keller, the biologist who led the research team, claimed.
- 3 Keller and his colleagues weren't [66](1. intuitively 2. intentionally 3. initially) sure why the ants were dying, but they had recently developed a tool that they thought might solve the puzzle: an automated system for tracking ant movements. They printed unique patterns on tiny squares of white paper and glued them, like bar codes, to the backs of their carpenter ants. A camera snapped high-resolution photos as the ants skittered around, and a software program used the images to the position and orientation of each ant. The system wasn't foolproof. Some ant species are to mark because they remove or chew the tags, and some species are difficult to track because individuals sit on top of each other, thereby obscuring the tags. But the tags allowed the researchers easily collect billions of data points on the active, [67](1. annoying 2. industrious 3. obedient)

The system revealed, for instance, that ants are restless workers, shifting careers—from nurses to cleaners to foragers—as they age.

4 Keller’s team thought that their automated tracker might help explain why isolated ants died so quickly and how the ants’ behavior changed when their social ties had been severed. And so the researchers [68](1. set 2. left 3. came) out to create some lonely ants. They assembled isolation chambers, small plastic boxes containing food, water, and a capsule that was designed to serve as a nest. Then they plucked a few hundred unlucky workers out of their colonies, glued bar codes to their backs, and introduced them to their new homes. The ants were assigned to the boxes in different combinations—some moved in utterly alone, [69](1. after 2. if 3. while) others were housed in pairs, in groups of ten, or with several squirming larvae. Then the insects went back to their lives, and the scientists waited for them to die. As their final moments approached, the ants would begin to shake. “Finally, they lay down and stop moving,” Akiko Koto, a co-author of the new study, said.

5 The effect of isolation was [70](1. dramatic 2. minimal 3. immeasurable). The ants that lived in groups of ten survived for about sixty-six days, on average. The solitary ants died after just six and a half. Ants that lived with larvae or in pairs had intermediate life spans, averaging twenty-two and twenty-nine days, [71](1. reactively 2. retroactively 3. respectively). When the researchers analyzed the movement data, they discovered that the companionless ants were hyperactive, spending huge amounts of time roaming around the plastic box, especially near the walls. During the first day alone, the lonesome ants walked twice as far as those that lived in groups of ten. This ceaseless locomotion is likely a stress response, Keller said, though Koto painted a [72](1. more poignant 2. less forgiving 3. brighter) picture. “I think it’s somehow expected,” she said. “In a natural condition, in the park or in a forest, if the ants lose their colonies, they’ll try to find their mother colonies.” The ants, in other words, may have been looking for their families.

6 Keller, Koto, and their colleagues speculated that this excessive exercise might be responsible for the ants’ rapid [73](1. deconstruction 2. demise 3. discontinuation)—perhaps the ants weren’t eating enough to fuel their lengthy activities. So they conducted a second experiment, giving both isolated and group-living ants blue sugar water to eat. Then they dissected them, which Koto claims is easier than it sounds. “Oh, it’s not so difficult!” she said. “I just need a forceps for the surgery.”

7 When Koto inspected the insects’ insides, she saw that they were all eating approximately the same amount of food. But the solitary ants didn’t seem to be digesting it properly. Typically, ants are social eaters. When foragers first ingest their food, they store it in a balloon-like sac called the crop, which has also been called “the social stomach.” When the ants return to the nest, they

generously regurgitate some of this food to share with their relatives. [74](1. Whatever 2. Whichever 3. However) food remains in the crop is then pumped into the digestive tract. But when the researchers examined the ants twenty-four hours after their meals, they discovered that the isolated ants had [75](1. implicitly 2. significantly 3. indefinitely) less food in their digestive system than the grouped ants did. “The food doesn’t transit in a normal way in the digestive system,” Keller said. Stuck in the crop, the food was unable to provide the itinerant insects with much needed energy.

8 The researchers aren’t yet sure exactly what causes the digestive slowdown. Maybe it’s stress. Maybe the fluid that ants exchange when they share food [76](1. stimulates 2. interferes with 3. clogs) digestion. Maybe they die still looking for a relative to break bread with. “They store the food in the crop to share with nestmates, but they can’t find them,” Koto said. Koto, who moved from Tokyo to Lausanne to take a position as a postdoctoral fellow in Keller’s lab, has since returned to the University of Tokyo. But she still [77](1. cohabitates 2. conspires 3. collaborates) with her Swiss colleagues; they are currently studying how isolation affects the insects’ gene expression, in [78](1. hopes 2. spite 3. fear) of identifying precisely what’s disrupting their digestion.

9 Until they [79](1. take out 2. screw up 3. nail down) the underlying mechanism, it’s hard to know how much to extrapolate from a handful of alienated ants. “A lot of people ask me whether the effect of social isolation is also the same in humans and other animals,” Koto said. “We have to be careful.” There are, of course, sizable differences in the social structures and eating behaviors of ants and humans—we are, one hopes, considerably less likely to regurgitate our food and feed it to our friends. In humans, in particular, the connection between isolation and health is complex, and many mechanisms, both physiological and behavioral, are likely to be involved. For instance, isolation may increase inflammation, but it may also lead people to engage in more self-destructive behavior, such as chronic drinking. Nevertheless, the Lausanne findings suggest that isolation can alter physiology in ways that we are only beginning to understand. The scientists who study it—whether in humans, parrots, mice, or other animals—would do well to peer into the gut, which has typically been [80](1. overfilled 2. overlooked 3. overemphasized). “It would not be surprising if you find similar processes in a large number of species,” Keller said. Perhaps all lonely creatures are like the solitary carpenter ant: heartburned and seeking home.

—Based on Anthes, E. (2016). *Marching one by one*. *The New Yorker*.

[81] Michael Bloomberg is mentioned in the 1st paragraph because

1. he disputed the findings of the research discussed in the article.
2. loneliness appears to be far healthier than the things he was concerned about.
3. the research findings in the article influenced his policies in a controversial way.
4. loneliness is often an overlooked health risk in our society.

[82] According to the article, which of the following is true?

1. Loneliness appears to be more dangerous for ants than for humans.
2. We have a deep understanding of how isolation influences physiology.
3. Research into ants may offer some insights into human problems.
4. Poor digestion and isolation are two of the most important health risks for most animals.

[83] Which of the following best describes the “crop” mentioned in the 7th and 8th paragraphs?

1. A container in an ant’s body for both holding food for sharing, and for personal digestion.
2. An organ specific to carpenter ants which is the last step in their digestive process.
3. The region in a nest where ants leave food for later consumption for themselves and nestmates.
4. Seasonal foods that grow near a nest, on which ants sustain themselves.

[84] What is meant by “to break bread with” in the 8th paragraph?

1. To waste food.
2. To eat socially.
3. To break poor eating habits.
4. To forage food for the community.

[85] What is meant when it is said that scientists “would do well to peer into the gut” in the 9th paragraph?

1. Shorter lives are often the result of health risks brought on by loneliness.
2. Obesity can be a cause of loneliness in many animals.
3. Over-eating is a common problem across species.
4. Digestion may be key to understanding some of the bad effects of loneliness.

[86] Which of the following is ***NOT*** mentioned in the article?

1. Measures taken by governments to curb the health effects of loneliness.
2. Various animals that appear to be harmed by isolation.
3. The locations where research on isolation is being conducted.
4. Details about the experimental procedure undertaken in the research.

[87] According to the article, what is true about the experiments conducted on the ants in the study?

1. Isolated ants were found to walk less than their communal counterparts.
2. Multiple diseases are suspected to be worsened by loneliness.
3. Research is currently being done on three continents.
4. Dissection of ants is a complicated process that few are able to accomplish.

[88] According to the article, which of the following is a condition possibly linked to isolation in humans?

1. Diabetes.
2. Cancer.
3. Alcoholism.
4. Obesity.

[89] Which of the following is ***NOT*** a claim made in the article?

1. Dissection was difficult and uninformative in the study, because ants are too small.
2. Humans are different from ants, so we should be cautious about generalizing.
3. Loneliness and isolation might cause health problems across many species.
4. Isolated ants may have walked themselves to death in the study.

[90] What kind of programs might result from the research mentioned in this article?

1. Mandatory nutritional advice in schools.
2. Social activities to encourage people to make new friends.
3. A marketing campaign presenting the benefits of walking.
4. Restrictions on trans fat usage in food production.

2017(平成29)年度 環境情報学部 一般入学試験問題 訂正

教科・科目	ページ	設問	誤	→	正
数学 または 情報	7	数学-IV	下から1行目 小数点第2位以下	→	下から1行目 小数点以下第2位
数学 または 情報	26	情報-V	7行目最初	→	7行目最初 (以下を挿入) 共通部分がないと仮定しても
外国語	18	英語-III	下から5行目～4行目 images to the position	→	下から5行目～4行目 images to calculate the position
外国語	18	英語-III	下から4行目～3行目 species are to	→	下から4行目～3行目 species are difficult to
外国語	18	英語-III	下から2行目～1行目 researchers easily	→	下から2行目～1行目 researchers to easily
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小論文	6	一ノ瀬 友博 研究会	問題文14行目 履修選抜注1)	→	問題文14行目 履修選抜(注1)