

デザイン工学部A方式Ⅱ日程・理工学部A方式Ⅱ日程
生命科学部A方式Ⅱ日程

1 限 英 語 (90分)

〈注意事項〉

1. 試験開始の合図があるまで、問題冊子を開かないこと。
2. 解答はすべて解答用紙に記入しなさい。
3. マークシート解答方法については以下の注意事項を読みなさい。

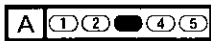
マークシート解答方法についての注意

マークシート解答では、鉛筆でマークしたものを機械が直接読みとって採点する。したがって解答はHBの黒鉛筆でマークすること(万年筆, ボールペン, シャープペンシルなどを使用しないこと)。

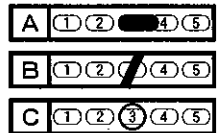
記入上の注意

1. 記入例 解答を3にマークする場合。

(1) 正しいマークの例



(2) 悪いマークの例



枠外にはみださないこと。

○でかこまないこと。

2. 解答を訂正する場合は、消しゴムでよく消してから、あらためてマークすること。
3. 解答用紙をよごしたり、折りまげたりしないこと。
4. 問題に指定された数よりも多くマークしないこと。

〔 I 〕 意思決定に関する次の英文を読み、以下の設問に答えよ。

If you think that decisions are based only on the evidence presented, think again. In fact, think about the question in a different language, assessing the risks inherent in making decisions. Your reactions may be surprising.

Researchers at the University of Chicago have found that people make more analytic decisions when they think through a problem in their non-native tongue. These findings have implications in many areas but especially for people doing business in a global economy.

People are more likely to take favorable risks if they think in a foreign language, the study showed. ⁽¹⁾ “We know from previous research that because people are naturally loss averse*¹, they often forget attractive opportunities,” said University of Chicago psychologist Boaz Keysar. “Our new findings demonstrate that such aversion*² to losses is reduced when people make decisions in their non-native language.”

Six experiments were conducted on three continents with over six hundred participants speaking five different languages: English, Korean, French, Spanish and Japanese. Participants all had to demonstrate proficiency in a foreign language, but were not balanced bilinguals. In all ⁽²⁾ of the experiments, the participants had to make decisions that involved some sort of assessment of the value and the potential risk of pursuing one ⁽³⁾ action rather than another. ⁽⁴⁾

In one of the most telling ⁽⁵⁾ experiments, researchers tested native English speakers at the University of Chicago who gained Spanish proficiency in the classroom to see how loss aversion influenced their decision-making. The experiment explored how likely the students were to take attractive bets on the language.

Each was given \$15, in one-dollar bills, from which they took one dollar
^(あ)

for each bet. They could either keep the dollar or risk it for the possibility of gaining an extra \$1.50 if they won a coin toss. The bets were attractive because statistically, the students would gain rather than lose if they took all 15 bets.

In English, the students thought myopically*³, and focused ③ their fear of losing each bet. They took the bet only 54 percent of the time in English, while they took it 71 percent of the time in Spanish.

“Perhaps the most important mechanism for the effect is that a foreign language has less emotional influence than a native tongue,” co-researcher Hayakawa said. “An emotional reaction could lead to decisions that are motivated more by fear than by hope, even when the odds are highly favorable.”

The team also tested the asymmetry of choice depending on the way a question is framed. Presenting the same question in different ways affects people’s decisions. ^(t) In general, people avoid risk when the question is framed in a positive way, but they accept risk when the question is set in a negative way. This is ④ contrast to economic theory, where decisions are made regardless of how a situation is presented.

Through a series of experiments in Korea, France and the United States, the team showed that the asymmetry disappears when a person makes decisions in a foreign language. The students were able to evaluate the choices based on expected outcomes rather than having their decisions influenced by the different presentation of the problems.

These new findings help scholars and others understand how people in a global society make decisions as more and more people use a foreign language on a daily basis, the researchers write. The advantage given by thinking in a foreign language can be greatly beneficial in making decisions in a business setting or in personal finance.

“People who routinely make decisions in a foreign language might be

less biased in their savings, investment and retirement decisions, as they
⁽⁶⁾ show less myopic loss aversion. Over a long time horizon, this might very well be beneficial,” they said.

So, is it better to make decisions in a foreign language? The team is currently investigating decisions ⑤ the opposite is true. “It depends on the role of emotions in the specific situation,” Keysar said.

*¹ averse : ~に反対で, ~をきらって

*² aversion : 嫌悪の情, いやがること

*³ myopically : 近視眼的に, 視野が狭く

問1 下線部(1)~(6)の語について, 文脈に照らし最も適しているものをそれぞれイ~ニから一つ選び, その記号を解答用紙にマークせよ。

(1) favorable

イ worthwhile

□ pleasant

ハ unreadable

ニ ignorable

(2) proficiency

イ specialty

□ willingness

ハ fluency

ニ diploma

(3) assessment

イ judgment

□ accumulation

ハ comparison

ニ presentation

(4) potential

イ invisible

□ possible

ハ powerful

ニ effective

(5) telling

イ referred

□ successive

ハ famous

ニ significant

(6) biased

イ engaged

□ tumbled

ハ persisted

ニ unbalanced

問2 空欄①～⑤に入る最も適切な語をイ～ニから一つずつ選び、その記号を解答用紙にマークせよ。

- | | | | | |
|---|-----------------|----------|-------------|---------|
| ① | イ few | ロ little | ハ much | ニ many |
| ② | イ concentrating | | ロ depending | |
| | ハ switching | | ニ touching | |
| ③ | イ at | ロ in | ハ on | ニ to |
| ④ | イ with | ロ for | ハ in | ニ on |
| ⑤ | イ how | ロ what | ハ which | ニ where |

問3 文中の内容と一致する英文をイ～へから二つ選び、その記号を解答用紙にマークせよ。

- イ People think more analytically in a foreign language as their communication ability improves.
- ロ When people bet in their mother tongue, they play conservatively.
- ハ Decision-making might be influenced by psychological factors which cannot be explained by economic theory.
- ニ People try to avoid risks to maximize their gains when they are asked a negatively framed question.
- ホ The findings are not applicable to many fields except global business.
- へ The researchers began to doubt the foreign-language effect on decision-making.

問4 下線部(あ)の内容に添って、下記の問いに対する正解をイ～ニから一つ選び、その記号を解答用紙にマークせよ。

One student who participated in the coin-toss experiment had \$20 in total after ten tosses. How many bets did he win?

イ 4 ロ 5 ハ 6 ニ 8

問5 下線部(い)で説明される現象を要約する文として、最もふさわしいものをイ～へから一つ選び、その記号を解答用紙にマークせよ。

- イ How questions are framed results in preference reversal.
- ロ The process of decision-making is risky.
- ハ Risk assessment contains a mathematical framework.
- ニ Personal characteristics influence decision-making.
- ホ Questioners' habits influence decision-making.
- へ Mental obsessions result in decision-making disorders.

〔Ⅱ〕 数学者フェルマーに関する次の英文を読み、設問に答えよ。

Most of history's great thinkers are remembered for their completed works. Think of Newton's *Principia*, Kant's *Critique of Pure Reason*, or Darwin's *Origin of Species*. These are people who slaved away for decades, each producing works that are today widely regarded A masterpieces.

Not so for the 17th century French mathematician Pierre de Fermat. To be sure, Fermat had many achievements. He helped develop analytic geometry along B fellow Frenchman René Descartes. He planted the seed that would blossom into differential calculus⁽²⁾*¹. He made important contributions to optics, probability theory, and most of all, number theory. He was fluent in five languages. And he managed all of this while holding down a job as a lawyer.

But Fermat is best remembered not for what he did, but for what he left undone. One day in 1637, while reading his copy of an ancient Greek text by the 3rd century mathematician Diophantus, Fermat wrote down a note in the margins that would drive mathematicians crazy for the next four centuries.

Fermat's marginal notes, which were written in Latin and later discovered by his son after he died, read: "It is impossible to separate a cube into two cubes, or a fourth power into two fourth powers, or in general, any power higher than the second, into two same powers. I have discovered a truly marvelous proof of this, which this margin is too narrow to contain."

In other words, ① can never equal ②, as long as a, b, and c are positive integers*² and as long as n is greater than two.

Go ahead and put in some numbers for a, b, c, and n, and you'll see that they don't add up, or just take our word for it. But it turns C that coming up with a mathematical theorem proving it for every integer greater than two is really, really, really hard.

Even though he lived for another 28 years, Fermat never got around to sharing his “truly marvelous proof” with anyone, as far as we know.

Subsequent generations of mathematicians chipped away at it. Fermat⁽⁵⁾ himself had accidentally proved it for $n=4$, in his only surviving mathematical proof. By the beginning of the 19th century, it had been proven for $n=3$, $n=5$, and $n=7$, but a general proof was nowhere D sight. In 1815, the great French mathematician Sophie Germain proved it for a special class of prime numbers*³ now called Sophie Germain primes, which opened the door to further proofs.

By 1993, Fermat’s Last Theorem had been solved for all prime numbers less than four million, but the universal proof remained to be solved. For many years, Fermat’s hypothesis held a spot in the Guinness Book of World Records as the World’s Most Difficult Math Problem.

It was finally solved in 1994 by British mathematician Andrew Wiles, whose proof took seven years to complete and contained E 100 pages. Wiles, who was knighted for his efforts, used advanced algebraic geometry that was not available to anyone in the 17th century, suggesting that Fermat took a different approach in his unpublished proof.

Still, if Fermat had somehow managed to publish his proof during his lifetime, he would probably not be nearly as famous as he is today. So the next time someone asks you about the dishes in the sink, the half-written novel in the desk drawer, or a classic car left to be repaired in your garage, simply think of Fermat, and respond that you have a truly marvelous plan to finish your project, but that the day is too narrow to contain it.

*¹ differential calculus : 微分学

*² integers : 整数

*³ prime numbers : 素数

問1 文中の空欄 ~ に入る最も適切な単語を次のイ~ヌから選び、その記号を解答用紙にマークせよ。同じ選択肢を二度以上繰り返して使うことはできない。

- | | | | |
|--------|--------|--------|-------|
| イ at | ロ more | ハ over | ニ out |
| ホ so | ヘ as | ト back | チ on |
| リ with | ヌ in | | |

問2 文中の空欄 , に入る適切な文字式をイ~ニからそれぞれ一つずつ選び、その記号を解答用紙にマークせよ。

- | | | | |
|-----------------|---------------|----------------|--------------------|
| ① イ $n^a + n^b$ | ロ $a^n - b^n$ | ハ $a^n + b^n$ | ニ $n^a \times n^b$ |
| ② イ c^n | ロ n^c | ハ $c \times n$ | ニ $c \div n$ |

問3 下線部(1)~(5)の内容に最も近いものをイ~ニから一つずつ選び、その記号を解答用紙にマークせよ。

(1) people who slaved away

- イ people who worked as slaves
- ロ people who devoted their lives to their work
- ハ people who found a way to change the world
- ニ people who struggled to sell their works

(2) He planted the seed that would blossom into differential calculus.

- イ Differential calculus became famous as a result of his work.
- ロ His contribution to differential calculus was small like a seed.
- ハ His work led to the development of differential calculus.
- ニ He was the first person to complete differential calculus.

(3) It is impossible to separate a cube into two cubes

- イ A cubic equation cannot be solved using two cubic equations.
- ロ A cubic block cannot be broken into two cubic blocks.
- ハ A triangle shape can be separated into two triangle shapes.
- ニ A third power cannot be separated into two third powers.

(4) take our word for it

- イ believe what we say
- ロ take it easy
- ハ calculate it as we say
- ニ ignore what we say

(5) Subsequent generations of mathematicians chipped away at it.

- イ Mathematicians tried to prove Fermat's Last Theorem, but did not make any progress.
- ロ Mathematicians expected future mathematicians would prove Fermat's Last Theorem.
- ハ Mathematicians continued to work on Fermat's Last Theorem.
- ニ Mathematicians gave up proving Fermat's Last Theorem.

問4 本文の内容と一致する英文を二つ選び、その記号を解答用紙にマークせよ。

- イ René Descartes made important contributions to many scientific issues, such as differential calculus, optics, probability theory and number theory.
- ロ Fermat provided a single example of proof for his Last Theorem.
- ハ If the margin had been wide enough, Fermat could probably have given the general proof for his Last Theorem as done by Andrew Wiles.
- ニ It was in the 19th century when Fermat's Last Theorem was finally solved by Sophie Germain.
- ホ People may become famous in the future due to their unfinished works.
- へ Before Fermat's Last Theorem was completely proved, it was solved for prime numbers less than four million by Andrew Wiles.

〔Ⅲ〕 次の各設問に答えよ。

問1 次の各文が最も自然な文になるように、それぞれ三つのカッコから適切な語を一つ選び、その記号を解答用紙にマークせよ。

例 The (イ teacher □ mechanic ハ solicitor) wrote the
(ニ letter ホ answer ヘ notebook) on the (ト floor
チ board リ ceiling).

解答：イ, ホ, チ

- (1) The (イ umpire □ soldier ハ caretaker) blew her
(ニ smoke ホ whistle ヘ candle) to end the (ト match
チ battle リ lesson).
- (2) Hanako (イ phoned □ decided ハ enjoyed) to have a
(ニ accident ホ dream ヘ party) on her (ト weekend
チ birthday リ house).
- (3) The (イ cooker □ man ハ tiger) put his (ニ bicycle
ホ glasses ヘ brother) in his (ト ceiling チ chair
リ pocket).
- (4) We bought a new (イ sofa □ shower ハ lawn) for the
(ニ kitchen ホ living-room ヘ factory) in the July
(ト effect チ sales リ shop).
- (5) Her (イ attitude □ handwriting ハ speech) was
(ニ terrible ホ marvelous ヘ backwards). I just couldn't
(ト read チ eat リ find) it.

問2 次の文の空欄に入る最も適切な語をそれぞれイ～ニから一つ選び、その記号を解答用紙にマークせよ。

(1) We had a discussion about how society should be structured.

イ wild □ heated ハ rigid ニ needy

(2) My sister was ill last summer, but fortunately is now a slow but steady recovery.

イ taking □ making ハ doing ニ turning

(3) Taro is always on time. He's so .

イ careless □ boring ハ punctual ニ timeless

(4) He made the mistake of forgetting to put the "s" on a verb in the third person singular.

イ classic □ important ハ careful ニ famous

(5) Excuse me. May I your phone?

イ lend □ catch ハ take ニ use

〔IV〕 図を参考にして次の英文を読み、以下の設問に答えよ。

The countries of South and Southeast Asia are home to more than 30 percent of the world's population, about half of whom depend on agriculture — mainly rice, but also other crops such as wheat — for their livelihoods. But according to the World Bank, global warming could reduce agricultural productivity in the region A 10 to 50 percent in the next 30 years.

Some changes are apparent already. For instance, steadily rising sea levels have already led to an increase in the salt level of the water in Vietnam's Mekong Delta, where the Mekong River empties into the South ⁽¹⁾ China Sea. This has forced some people in the region to abandon rice production and shift to fish farming.

In the long term, such changes could force Asian countries to shift their rice farms to other locations, similar to how some wineries in Australia have moved to cooler areas to counter ⁽²⁾ the harmful effects of global warming on their grapes.

But in other circumstances adaptation can require only a gradual shifting of farming systems. One such solution discussed at the Bangkok International Agricultural Workshop was using Managed Aquifer Recharge (MAR) technology in the region. MAR involves using land in upstream areas of major rivers to capture and store floodwater in natural underground aquifers, and then pump it out during dry spells ⁽³⁾ for farmers to use.

“The idea is to set aside land for recharge basins or ponds where the soil conditions will allow water to infiltrate very quickly into the ground and pump it out later for watering crops,” Matthew McCartney, a researcher with the International Water Management Institute, explained.

MAR has been used for water storage in arid ⁽⁴⁾ areas such as Australia and Southern Europe, but not in relatively wet regions that get regular

rainfall such as Southeast Asia, he added.

But the use of MAR in the region makes sense, because it could simultaneously solve two major problems that scientists foresee affecting the region. First, it would create a backup source of water that farmers could draw B in times of dry weather. It could also reduce damage from floods by diverting water from swollen rivers. “In Thailand, it could have had a major impact in reducing the flooding last year in Bangkok,” McCartney said. The floods caused \$40 billion in damage.

Early calculations indicate that about 40 square miles (100 square kilometers) of recharge basins could supply water to more than 770 square miles (2,000 square kilometers) of farmland. Rather than establishing one large recharge basin, the idea is to create lots of smaller basins in suitable locations across the landscape.

“You could quite easily compensate for the loss of production in the land that you’ve set aside for the recharge basin,” McCartney said. ⁽⁵⁾

Juliet Christian-Smith, a senior researcher at the Pacific Institute in California, agreed that groundwater storage technologies C MAR could provide useful protection against the increased variability in rainfall that climate models predict.

“There are a lot of positives associated with storing water underground,” Christian-Smith said. ⁽⁶⁾ “We usually think of our water supply as coming from surface water such as snowmelt and rivers, but in fact much of the water that supports farming and our global food supply comes from groundwater, and in many cases it is being used up faster than it is being recharged, leaving room for underground storage.”

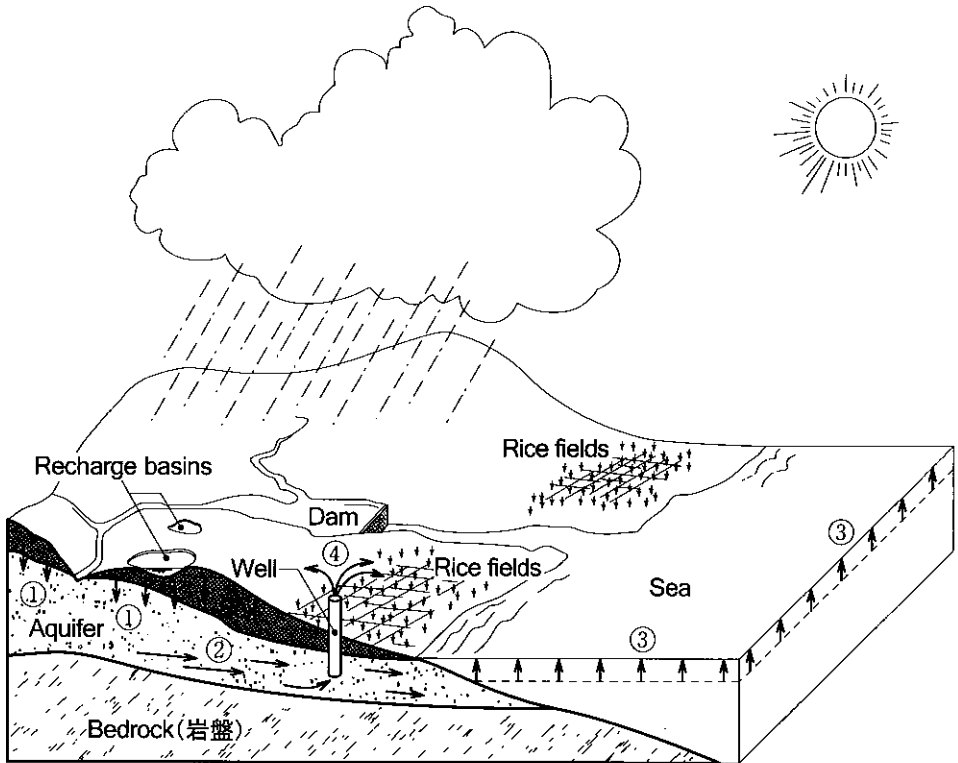
“Because it stores water underground, MAR isn’t vulnerable to some of the problems that trouble dams,” she added. ⁽⁷⁾ For example, climate simulations predict that many parts of the Earth will experience warmer temperatures, which will in turn decrease the water level at dams. “There

are also problems with frequent flooding. If you have more flooding, you could have more mud piled up at the bottom of a dam," she said. "That means your dam life and the amount of water it can store is reduced."

McCartney said MAR use in Southeast Asia is still only at the idea stage. "It hasn't gone beyond people thinking about it," he said. "There would need to be quite a lot more research."

One question that will need to be resolved is what impact recharge has D water quality. A recent study in Bangladesh, for example, indicates that repeated recharging of water into underground aquifers could let toxic chemicals out of the ground and concentrate it in the water supply.

(8)



MAR概念図

問1 MAR概念図で矢印①～④は水の移動を表している。それぞれの矢印を説明するのに最も適切な語(句)をイ～チから一つ選び、その記号を解答用紙にマークせよ。

イ saltwater intrusion	ロ surface water flow
ハ watering crops	ニ infiltration of surface water
ホ falling water	ヘ rising sea level
ト evaporation	チ groundwater flow

問2 下線部(1)~(8)の言い換えとして最も適切な語(句)をそれぞれイ~ニから一つ選び、その記号を解答用紙にマークせよ。

(1) empties into

イ flows into

□ goes along

ハ moves out of

ニ runs through

(2) counter

イ consider

□ count on

ハ disapprove

ニ reduce

(3) spells

イ holidays

□ hours

ハ periods

ニ years

(4) arid

イ cloudy

□ dry

ハ humid

ニ rainy

(5) compensate

イ create

□ make up

ハ miss

ニ stand up

(6) positives

イ merits

□ means

ハ possessions

ニ processes

(7) vulnerable to

イ convenient for

□ likely to

ハ possible with

ニ affected by

(8) toxic

イ dark

□ heavy

ハ poisonous

ニ strong

問3 空欄 ～ に入る最も適切な語(句)をイ～ニから一つ選び、その記号を解答用紙にマークせよ。

A

イ by ロ for ハ from ニ under

B

イ about ロ by ハ from ニ to

C

イ as of ロ for example ハ for instance ニ such as

D

イ at ロ for ハ of ニ on

問4 本文の内容と一致する英文をイ～リから三つ選び、その記号を解答用紙にマークせよ。

- イ Southeast Asian farmers are moving to higher locations due to gradually rising sea levels.
- ロ Many Vietnamese farmers are switching from rice farming to stock farming for economic reasons.
- ハ MAR is the process that adds excess water to aquifers during wet seasons for use in dry seasons.
- ニ Groundwater pollution may occur if aquifers are frequently recharged.
- ホ Without financial incentives, Southeast Asian farmers cannot apply MAR technology to their area.
- へ Despite the Bangkok Agricultural Workshop, MAR lacks community support due to the risk of pollution.
- ト According to McCartney, many small recharge basins are more economical than injection wells.
- チ The performance of MAR technology can be affected by widespread flooding.
- リ MAR technology is useful for preventing flooding and for supplying water to lower farmland in dry seasons.

