

I

次の空所を埋めよ。(配点 40)

- (1) 2 次方程式 $2x^2 + 5x + 4 = 0$ の異なる 2 つの解を α, β とすると,
 $\alpha + \beta, \alpha^2 + \beta^2$ の値はそれぞれ $\alpha + \beta =$, $\alpha^2 + \beta^2 =$ である。
- (2) 不等式 $\log_3(x - 1) + \log_3(x + 1) < 2$ を解くと, $< x <$ である。
- (3) 方程式 $x^2 + y^2 + px + qy + 5 = 0$ で表される半径 r の円 (ただし p, q, r は定数) が 2 点
 $A(1, 4), B(-2, 5)$ を通るとき, p の値は $p =$ であり, 半径 r の値は $r =$ である。
- (4) 下の表は 10 人で, あるゲームをしたときの得点と人数に関する度数分布表である。

得点	0	1	2	3	4	5	6	7	8	計
人数	0	3	1	1	1	2	1	0	1	10

このとき, 得点の平均値は であり, 中央値は である。

II

次の空所を埋めよ。(配点 30)

- (1) 鋭角三角形 ABC について $AB = 4, AC = 13$, 面積が 24 であるとき,
 $\sin \angle BAC$ の値は である。また BC の長さは, $BC =$ である。
- (2) $75^\circ = 45^\circ + 30^\circ$ であることを利用すると, $\sin 75^\circ$ の値は である。
 また, $22.5^\circ = \frac{45^\circ}{2}$ であることを利用すると, $\sin 22.5^\circ$ の値は である。
- (3) 関数 $y = 4 \sin x + 3 \cos x$ の最大値は であり, 最小値は である。

III

関数 $f(x) = 2x^3 + 6x^2$ について, 次の問いに答えよ。(配点 30)

- (1) 曲線 $y = f(x)$ と x 軸との共有点の x 座標をすべて求めよ。
- (2) 関数 $f(x)$ の増減表をかけ。
- (3) 曲線 $y = f(x)$ と x 軸で囲まれた図形の面積を求めよ。
 ただし, $\int x^3 dx = \frac{x^4}{4} + C$ (C は積分定数) を用いてよい。
- (4) 曲線 $y = f(x)$ の接線のうち, 点 $(1, 8)$ を通るものをすべて求めよ。

I 次の会話を読み、下記の設問に答えよ。(配点 28)

A family of four are talking over dinner.

Son: Hey, Dad. Why are you home so early today?

Father: We finished a project early so I didn't have to work overtime.

Mother: It's great to have you home at dinner for a change. You've been working late every day recently.

Father: It's great to be here. Now this project is over, I hope I can spend more time at home. How about you, Charlie? How was your day?

Son: It was great. I went around to Billy's house on the way home from school. We had fun playing computer games.

Mother: How was school today?

Son: OK. It was our teacher's birthday so we sang "Happy Birthday" at the end of class. He .

Mother: I'm sure he was.

Father: How about you, Rachel? How was your day?

Daughter: Not so good. I was so busy. I was studying for tomorrow's math test.

Mother: You've been working really hard this week, haven't you?

Daughter: Yes, I have. But I still haven't finished it. Our teacher us to review twenty pages for the test but I still have ten more to do.

Father: Do you have any tests tomorrow?

Daughter: Yes. I have a science test as well.

Father: Well, your best. I'm sure you'll be OK.

Mother: Charlie, did you finish your homework?

Son: No, not .

Mother: Well, finish it before you watch TV.

Father: And how was your day, darling?

Mother: Oh you know. The same as ever.

(1) Which of the following words or phrases is best to fill in ~ ? Choose the best answer and mark the number on the answer sheet.

- | | | | | |
|--------------------------------|------------------|-------------|---------------------|-----------------|
| <input type="text" value="1"/> | ① a lot of | ② many | ③ too | ④ very |
| <input type="text" value="2"/> | ① feel surprised | ② surprised | ③ surprisingly felt | ④ was surprised |
| <input type="text" value="3"/> | ① did | ② had | ③ said | ④ told |
| <input type="text" value="4"/> | ① another | ② other | ③ others | ④ the other |
| <input type="text" value="5"/> | ① bring | ② do | ③ fight | ④ pass |
| <input type="text" value="6"/> | ① already | ② nearly | ③ still | ④ yet |

(2) Which of the following statements about the mother and father is true according to the conversation? Choose the best answer and mark the number on the answer sheet.

- ① The father does not usually get home from work early.
- ② The father always eats dinner with his family.
- ③ The mother thinks her daughter has hardly studied this week.
- ④ The mother spent an unusual day.

(3) Which of the following statements about the children is true according to the conversation? Choose the best answer and mark the number on the answer sheet.

- ① Charlie went to Billy's house after school.
- ② Charlie's class sang "Happy Birthday" today because it was his birthday.
- ③ Rachel had a good day at school today.
- ④ Rachel will have a test the day after tomorrow.

Ⅱ グラフを参照しながら次の会話を読み、下記の設問に答えよ。(配点 16)

Taro and Yuki are talking about what they have learned at school.

Taro: I learned that “tele” used in “television,” “telephone,” etc. has the meaning of “far away” in today’s English class.

Yuki: Speaking of “tele,” I’ve just learned the word “telework” preparing for a presentation in sociology. My topic is various working styles.

Taro: I guess telework means working from a distant place.

Yuki: Right. According to an article about telework, the percentage of companies introducing telework has been increasing. Most of it is what you could call mobile work.

Taro: Mobile work? What is it?

Yuki: You see some people checking business emails on the train. That is mobile work. Another form of telework is telecommuting. In that case, workers do their work at home instead of their office.

Taro: It seems that such working styles let people spend more time with their family. I think it will help reduce the number of workers who their jobs to take care of children or older family members.

Yuki: I think so, too. And there are also satellite offices. Sometimes companies have smaller offices in addition to their main office. The smaller offices are closer to the homes of some workers, who can sometimes work there instead of going to the main office.

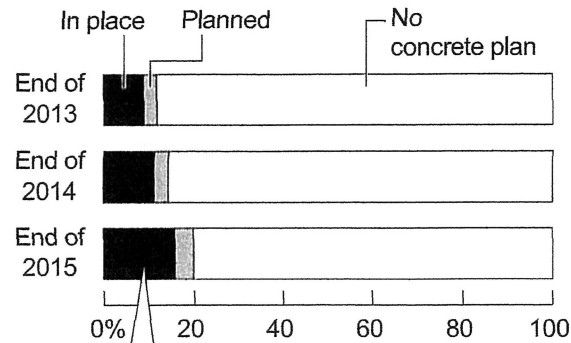
Taro: I wish our college had a satellite campus like that. It now me more than three hours to go to school.

(1) 空所 と に入る最も適切なものを、次の中からそれぞれ1つ選び、その番号をマークせよ。

- | | | | | |
|---------------------------------|--------|---------|--------|---------|
| <input type="text" value="9"/> | ① look | ② have | ③ quit | ④ start |
| <input type="text" value="10"/> | ① goes | ② makes | ③ has | ④ takes |

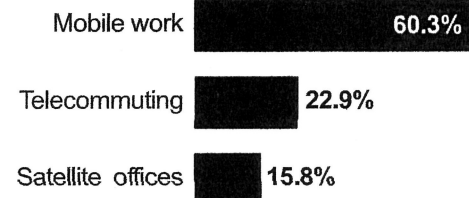
The State of Telework Systems in Japanese Companies

(companies with 100 or more employees in Japan)



Systems in use

(As of end of 2015; multiple answers allowed)



*Based on 2015 Communications Usage Trend Survey by
Internal Affairs and Communications Ministry*

(Telework raises efficiency, attracts workers (The Japan News, December 21, 2016))

- (2) 次の文の空所 (ア) と (イ) に入る語の組み合わせとして最も適切なものを、次の中から1つ選び、その番号をマークせよ。 11

It seems that (ア) commuting time and (イ) work efficiency are expected in telework.

- ① shorter — lower ② longer — higher ③ longer — lower ④ shorter — higher

- (3) 本文やグラフの内容に合うものを、次の中から1つ選び、その番号をマークせよ。 12

- ① Yuki has decided to work for a company which has a system of telework.
- ② Satellite offices are the most common form of telework now.
- ③ Telecommuting accounted for less than a quarter of the telework systems in use at the end of 2015.
- ④ The proportion of companies which had introduced telework decreased in 2015.

- III 次は、イギリスのアドベンチャー専門の旅行会社が 2017 年に出した広告のチラシ (brochure) である。英文を読み、下記の設問に答えよ。(配点 14)

Up to 40% off with our exclusive offer
OIT Adventure Holidays for 7-17 years olds



Since 1957, over 8,000,000 children and parents have discovered what makes *OIT* the UK's No.1 for children's adventure and activity holidays.

What's more, with our exclusive special offer you can now take advantage of up to 40% off your booking. Over 95% of our customers say they would book again. So if you've thought that a 'summercamp' style adventure experience isn't for your children, maybe it's time to think again.





We have 12 amazing centers in the UK, packed with the latest equipment and accommodation and set in private grounds, to enjoy and explore. We also offer more than 30 different holidays from one night to a week and from birthday parties to film making to suit every child and budget.

All you have to do is request our brochure to grab your exclusive offer of up to 40% off and find out for yourself what an *OIT* holiday can offer you and your children.

Holiday plans with this offer:

- A) 3-night Multi Activity holiday at our Boreatton Park Center in the Easter holidays – brochure price £225 per person, offer price £135 per child (saving 40%). Adults at full price only.
- B) 7-night Multi Activity holiday at our Hillcrest Center in August – brochure price £549 per child, offer price £329.40 per child (saving 40%). Sorry, not for adults, children under 7, and pets.

To get more information simply call FREE on 0800 123 4567 and quote your customer code: A123456, post the reply card with your details, or visit www.oit.co.uk.

(Promotion leaflet by PGL 2017 by The Royal Society for the Protection of Birds.
Reproduced with permission of PLG.)

(1) Thomas is 16 years old. He is interested in a three-night holiday at Boreatton Park Center as found in *OIT*'s Plan A. He is thinking of joining the holiday program with his father and two of his friends, aged 16 and 17. Which of the following is the correct charge for four? Choose the best answer and mark the number on the answer sheet. 13

- ① £540 ② £580 ③ £630 ④ £720

(2) Donald is a teacher. He needs more information to plan a trip for his class with *OIT*. Which way is NOT mentioned in the brochure? 14

- ① Visit one of their offices in his town.
② Telephone 0800 123 4567.
③ Visit the company's website.
④ Mail the reply card with his details.

(3) Which of the following statements about *OIT* is NOT true? 15

- ① It was started about sixty years ago.
② More than eight million people, including children, have taken an *OIT* holiday.
③ Less than five percent of those who experienced its programs say they would not book again.
④ It offers a 40% discount to every customer.

Ⅳ 次の自動運転のタクシーについての英文を読み、下記の設問に答えよ。(配点 42)

A woman in Fujisawa, Kanagawa prefecture normally would not be nervous riding in a taxi, but on this occasion, she admitted to some anxiety. She hitched a ride in a self-driving cab that started *cruising the streets here Feb. 29 as part of a trial run to test the robotic vehicles ahead of the 2020 Tokyo Olympics. "I tensed up the taxi switched to automatic driving mode," she said. "But the change was so (① I ② no ③ that ④ had ⑤ seamless) idea exactly when the switch took place." The trials, which will continue mid-March, are taking place in a *National Strategic Special Zone to test the autonomous vehicles in hopes of putting them to work during the Summer Games.

The self-driving taxis also are expected to see service providing rides to residents living in remote areas buses and other means of public transportation are in decline due to aging and *shrinking local populations.

They are the first such tests in the nation to take place on public roads. The tests are being conducted by a joint venture established by a major information technology firm and a start-up company developing autonomous driving technology.

The joint venture company will be testing its automated driving technology, *dispatch systems and other features vital in running robotic cabs over the course of two weeks during the trials. During the Feb. 29 trial run, a dispatch order was placed online a couple living in Fujisawa who acted as monitors for the project. The cab was quickly dispatched to pick up the couple.

The taxi was operated by a driver as it drove through residential neighborhoods, but once it got out to the main streets, it smoothly glided into automatic driving mode. The robotic cab successfully negotiated way to a supermarket and back for a total distance of four kilometers.

The joint venture strongly believes that putting automated taxis to practical use will help significantly cut personnel costs, allowing cab operators to reduce fares. "We hope to establish a service that assists those who need extra help getting around," said the president.

『The Asahi Shimbun AJW 2016.03.02付 Driverless taxis begin tests on public roads in Kanagawa (問題作成にあたり、文章を一部改変した。)』 承諾書番号 (18-0330)、朝日新聞社に無断で転載することを禁止する

注 *cruising 走行する

*National Strategic Special Zone 国家戦略特区

*shrinking 減少中の

*dispatch 配車

(1) 空所 16 ~ 21 に入る最も適切なものを、次の中からそれぞれ1つ選び、その番号をマークせよ。

- | | | | | |
|----|---------|---------|---------|--------|
| 16 | ① in | ② at | ③ with | ④ on |
| 17 | ① which | ② when | ③ what | ④ whom |
| 18 | ① until | ② for | ③ from | ④ by |
| 19 | ① what | ② where | ③ which | ④ who |
| 20 | ① in | ② by | ③ with | ④ to |
| 21 | ① it's | ② one's | ③ its | ④ ones |

(2) 下線部 1) ~ 5) と文脈を変えずに置きかえられる最も適切なものを、次の中からそれぞれ1つ選び、その番号をマークせよ。

- | | | | | | |
|----|---------------------------|------------------|---------------|--------------|----------------|
| 22 | 下線部 1) <u>vehicles</u> | ① cars | ② buses | ③ trucks | ④ trains |
| 23 | 下線部 2) <u>residents</u> | ① person | ② citizen | ③ inhabitant | ④ people |
| 24 | 下線部 3) <u>due to</u> | ① for sake | ② by reason | ③ because of | ④ instead of |
| 25 | 下線部 4) <u>glided into</u> | ① exchanged into | ② switched to | ③ flew from | ④ grinded with |
| 26 | 下線部 5) <u>operators</u> | ① engineers | ② factories | ③ developers | ④ companies |

(3) 下線部 (① I ② no ③ that ④ had ⑤ seamless)を、文脈に合うように並び替えて英文を完成し、3番目にくるものの番号をマークせよ。 27

(4) 本文の内容に合うものを、次の中から1つ選び、その番号をマークせよ。 28

- ① The woman always feels uneasy when she uses normal taxis.
- ② The testing of the self-driving taxis on public roads will begin in the near future.
- ③ The couple tried using the dispatch system, but the taxi didn't come soon.
- ④ The joint venture thinks the robotic cars will help lower the taxi fares.