

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 $\alpha + \beta = \boxed{\text{ア}}$, $\alpha^2 + \beta^2 = \boxed{\text{イ}}$ である。
- (2) 不等式 $\log_3(x - 1) + \log_3(x + 1) < 2$ を解くと, $\boxed{\text{ウ}} < x < \boxed{\text{エ}}$ 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 $p = \boxed{\text{オ}}$ であり, 半径 r の値は $r = \boxed{\text{カ}}$ 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 $\boxed{\text{キ}}$ であり, 中央値は $\boxed{\text{ク}}$ 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 $\boxed{\text{ア}}$ である。また BC の長さは, $BC = \boxed{\text{イ}}$ 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 $\boxed{\text{ウ}}$ 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 $\boxed{\text{エ}}$ である。
- (3) 関数 $y = 4 \sin x + 3 \cos x$ の最大値は $\boxed{\text{オ}}$ であり, 最小値は $\boxed{\text{カ}}$ 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.

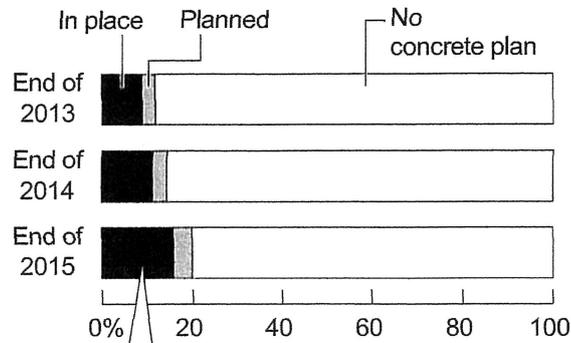
(1) 空所 と に入る最も適切なものを、次の中からそれぞれ1つ選び、その番号をマークせよ。

① look ② have ③ quit ④ start

① goes ② makes ③ has ④ takes

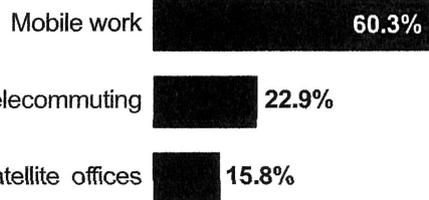
The State of Telework Systems in Japanese Companies

(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。

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。

- 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

OIT

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.

- 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?

- 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?

- 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 [16] Feb. 29 as part of a trial run to test the robotic vehicles ahead of the 2020 Tokyo Olympics. “I tensed up [17] 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 [18] 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 [19] 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 [20] 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 [21] 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 ~ 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="16"/> | ① in | ② at | ③ with | ④ on |
| <input type="text" value="17"/> | ① which | ② when | ③ what | ④ whom |
| <input type="text" value="18"/> | ① until | ② for | ③ from | ④ by |
| <input type="text" value="19"/> | ① what | ② where | ③ which | ④ who |
| <input type="text" value="20"/> | ① in | ② by | ③ with | ④ to |
| <input type="text" value="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。

- | | | | | | |
|---------------------------------|---------------------------|------------------|---------------|--------------|----------------|
| <input type="text" value="22"/> | 下線部 1) <u>vehicles</u> | ① cars | ② buses | ③ trucks | ④ trains |
| <input type="text" value="23"/> | 下線部 2) <u>residents</u> | ① person | ② citizen | ③ inhabitant | ④ people |
| <input type="text" value="24"/> | 下線部 3) <u>due to</u> | ① for sake | ② by reason | ③ because of | ④ instead of |
| <input type="text" value="25"/> | 下線部 4) <u>glided into</u> | ① exchanged into | ② switched to | ③ flew from | ④ grinded with |
| <input type="text" value="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。

(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。

- 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.

ヒロシ、タロウ、ケンイチ、アツシ、ゴロウの仲良し5人組が集まって話をしていたとき、5人のなかでの卓球の実力順位はどうなっているのだろうかとの話題になった。そこでこれを明らかにするために試合を行い、1位から5位の順位を決定した。ここで、各順位は必ず1人であり、2人以上が同順位ということはないものとする。

さて、5人の中での順位は決まったが、この順位は5人以外の人にはしゃべらず秘密にしようと約束した。具体的には、順位に関して誰かに尋ねられた場合は、

- ・自分自身を含め誰が何位であったかを直接的に話してはならない
- ・誰が何位であったかを特定できない内容であれば話してもかまわない
- ・1人の質問者に対して3つ以上の証言を述べた場合、うち1つはウソをついてもよいが、2つ以下の場合はウソをついてはならない

という約束をした。

この5人が卓球の順位を決めたとのうわさを聞きつけた明子は、5人の順位を探るため、5人それぞれに個別にインタビューを行い、得られた証言から5人の順位が一意に特定できることを確認した。具体的には、「ウソではない証言」と「ウソの証言の否定」のすべてを同時に満たす5人の順位は1通りしかないと確認した。

以下が明子が得た証言のすべてである。これら証言は上記で述べた5人の中での約束が守られていると考えてよい。

ヒロシの証言

- H1：ヒロシは3位以下ではない。
- H2：アツシは上位3人に含まれない。
- H3：ゴロウは4位か5位である。

タロウの証言

- T1：タロウは1位でもなく5位でもない。
- T2：ケンイチは上位3人に含まれない。

ケンイチの証言

- K1：ヒロシは1位か5位である。
- K2：タロウは1位から4位までのいずれかである。
- K3：ゴロウの順位は1位か2位である。

アツシの証言

- A1：ヒロシは2位ではない。
- A2：タロウは3位ではない。

ゴロウの証言

G1：ケンイチの順位は奇数である。

G2：アツシの順位は1位か4位である。

【問】

1. このインタビュー結果に基づき、5人の順位を以下の1)、2)、3)の手順で特定し、順位特定に至る過程を1200字以内の文章で説明せよ。

1) 正しいことがわかっている証言のみを使って特定できる順位をまず確定せよ。

2) 合計12個の証言の中にはウソの証言がいくつか混ざっている。

そこで、ウソの証言はどれかを特定せよ。

なお、ある証言が「ウソ」であることを示す方法は以下によること。

「ウソ」だと思われる証言を「正しい」と仮定すると矛盾が生じる(条件を満たす整合性の取れた5人の順位が存在しない)ことを示し、結果として「正しい」との仮定が誤り(つまり「ウソ」)であることを導く。

3) 1)、2)の結果を受けて残りの順位を確定せよ。

なお、解答文の中で証言を引用する場合は、証言の番号(H1、T2等)を必ず明記すること。

2. 問1で得られた5人の順位を解答欄に書け。

5人の証言内容を整理するため、表1から表5を使用してもかまわない。

表1 ヒロシの証言内容

証言者	証言番号	証言の対象	1位	2位	3位	4位	5位
ヒロシ	H1	ヒロシ					
		タロウ	—	—	—	—	—
		ケンイチ	—	—	—	—	—
	H2	アツシ					
	H3	ゴロウ					

表2 タロウの証言内容

証言者	証言番号	証言の対象	1位	2位	3位	4位	5位
タロウ		ヒロシ	—	—	—	—	—
	T1	タロウ					
	T2	ケンイチ					
		アツシ	—	—	—	—	—
		ゴロウ	—	—	—	—	—

表3 ケンイチの証言内容

証言者	証言番号	証言の対象	1位	2位	3位	4位	5位
ケンイチ	K1	ヒロシ					
	K2	タロウ					
		ケンイチ	—	—	—	—	—
		アツシ	—	—	—	—	—
	K3	ゴロウ					

表4 アツシの証言内容

証言者	証言番号	証言の対象	1位	2位	3位	4位	5位
アツシ	A1	ヒロシ					
	A2	タロウ					
		ケンイチ	—	—	—	—	—
		アツシ	—	—	—	—	—
		ゴロウ	—	—	—	—	—

表5 ゴロウの証言内容

証言者	証言番号	証言の対象	1位	2位	3位	4位	5位
ゴロウ		ヒロシ	—	—	—	—	—
		タロウ	—	—	—	—	—
	G1	ケンイチ					
	G2	アツシ					
		ゴロウ	—	—	—	—	—

問題

次の2問のうち1問を選択し、800字以上1,000字以内で解答しなさい。解答用紙の冒頭には、選択した問番号を記載すること。

問1. 知的財産を創造、保護及び活用することが、なぜ、国の産業や文化の発展に寄与することとなるのかを説明しなさい。説明に際しては、知的財産法が存在しなかった場合と現状との対比にも言及すること。

問2. 知的財産権に属する権利のうち一つを取り上げ、それがどのような権利であるのかを説明しなさい。また、最近、知的財産に関する事件の発生や国の施策などがしばしば報道されているが、上で取り上げた権利に関する比較的最近の報道案件を一つ取り上げ、その概要を説明するとともに、あなたの意見を述べなさい。