

平成 29 年度 入 学 試 験 問 題

医 学 部 (I 期)

英 語 ・ 数 学

注 意 事 項

1. 試験時間 平成 29 年 1 月 27 日, 午前 9 時 30 分から 11 時 50 分まで
2. 配付した試験問題(冊子), 解答用紙の種類はつぎのとおりです。
 - (1) 試験問題(冊子, 左折り)(表紙・下書き用紙付)
英 語
数 学(その 1, その 2)
 - (2) 解答用紙
英 語 1 枚(上端黄色)(右肩落し)
数 学(その 1) 1 枚(上端茶色)(右肩落し)
" (その 2) 1 枚(上端茶色)(左肩落し)
3. 下書きが下書き用紙で足りなかったときは, 試験問題(冊子)の余白を使用して下さい。
4. 試験開始 2 時間以降は退場を許可します。但し, 試験終了 10 分前からの退場は許可しません。
5. 受験中にやむなく途中退室(手洗い等)を望むものは挙手し, 監督者の指示に従って下さい。
6. 休憩のための途中退室は認めません。
7. 退場の際は, この試験問題(冊子)を一番上へのせ, 挙手し, 監督者の許可を得てから, 試験問題(冊子), 受験票, 下書き用紙および所持品を携行の上, 退場して下さい。
8. 試験終了のチャイムが鳴ったら, 直ちに筆記をやめ, おもてのまま上から解答用紙(英語, 数学(その 1), 数学(その 2)), 試験問題(冊子)の順にそろえて確認して下さい。確認が終っても, 指示があるまでは席を立たないで下さい。
9. 試験問題(冊子)はお持ち帰り下さい。
10. 監督者退場後, 試験場で昼食をとることは差支えありません。ゴミ入れは場外に設置してあります。
11. 午後の集合は 1 時です。

英 語

1 次の各組の単語について、(1)~(2)は一番強いアクセントの位置が他と異なるものを、(3)~(5)は下線部の発音が他と異なるものを、それぞれ1つずつ選び、記号で答えなさい。

- (1) A. con-tain B. post-pone C. as-sess D. per-sist E. cap-ture
(2) A. con-sist-ent B. mag-ni-tude C. al-li-ance D. ex-ter-nal E. po-tential
(3) A. radical B. gratitude C. ambulance D. palace E. patrol
(4) A. plausible B. respond C. perspective D. justify E. hemisphere
(5) A. cease B. treaty C. treadmill D. feature E. yeast

2 次の各文の()の中に入れるのに最も適切な表現を1つずつ選び、記号で答えなさい。

- (1) I want to be () help to you and will be here for you.
A. with B. on C. by D. in E. of
- (2) () we will finish on time depends primarily on the weather.
A. If B. When C. What D. How E. Whether
- (3) In () way am I annoying you?
A. such B. what C. somewhat D. how E. why
- (4) My sister washed the dishes with the faucet ().
A. ran B. running C. was running
D. being running E. has been running
- (5) () the 9,660 cases processed last year, only 10 percent were totally rejected.
A. Of B. In C. While D. When E. Whereas
- (6) Ethics deals () the problems of moral duty.
A. in B. with C. of D. about E. on
- (7) Frank's co-worker made () more mistakes than he did.
A. a lot of B. much C. many D. few E. such

- (8) Tom is confident he can () the serious head injury he suffered at the Tokyo tour.
 A. put out B. come across C. pull up D. go over E. get over
- (9) As many as ten-million children () with the virus by the end of the decade.
 A. will have been infected B. having been infected C. will infect
 D. will be infecting E. being infected
- (10) I am afraid he is out for lunch. Shall I have him () you back later?
 A. to call B. calling C. call D. to be calling E. called

3 次の各和文を英訳するとき、(あ)～(そ)の中に入れるべき単語1語をそれぞれ正しい形で答えなさい。ただし、()内にアルファベットが示されている場合は、そのアルファベットで始まる単語を答えること。

- (1) 日本のエンゲル係数は第二次大戦直後の混乱期における食糧不足のなかで60パーセントを越えたが、戦後の復興とそれに続いた経済成長のなかで、着実に値が下がった。

The Engel's coefficient for Japan, which topped 60 percent during the food (s あ) in the chaos right after World War II, steadily declined during the postwar reconstruction and subsequent economic (g い).

- (2) あまりにも渋滞していたので、30分遅刻してしまった。

There was so much (t う) that I was half (え) hour late.

- (3) 私は非常に忙しい。今年は休みがとれないくらいかもしれない。

I am very busy — so (お)(か) that I won't be able to take time off this year.

- (4) 海外旅行中は不便をいろいろ我慢しなければいけない。

There are many inconveniences that have to (き) put (く)(け) when you are traveling abroad.

- (5) 日光にあたることと皮膚ガンとの間に関係があるということには、なるほどと思えるような証拠がある。

There is convincing (e こ) of a link between exposure to sun and skin (さ).

(6) 相対性理論によれば、光より速く伝わるものはない。

According to the (し) of relativity, (す) can travel faster than light.

(7) 心理学とは、心と、心がどのように行動に影響を与えるかということに関する科学的研究である。

Psychology is the scientific study of the (m せ) and how it influences behavior.

(8) 私の正面に、糸杉の木がいく本かあった。

(そ) me there were some cypress trees.

4 次の各対話中の(あ)～(お)に入れる表現として最も適切なものをそれぞれ選択肢から1つずつ選び、記号で答えなさい。

[対話1]

Man 1: Excuse me, sir.

Man 2: Yes. Is anything wrong?

Man 1: You should not smoke in this building. Can you see the no-smoking sign on the wall?

Man 2: Oh, (あ) (い) more careful.

(あ)

- A. it could be.
- B. I'd rather not.
- C. I see.
- D. I did.
- E. is it?

(い)

- A. I should have been
- B. I may be
- C. I can be
- D. I ought to
- E. I had been

[対話 2]

Woman 1: How long have you been learning Spanish?

Woman 2: For about ten years.

Woman 1: You must be fluent in Spanish then.

Woman 2: Well, yes. (う), I am now even writing a novel in Spanish.

Woman 1: Wow, as a Spanish speaker myself, (え) to read your novel.

(う)

- A. In fact
- B. Eventually
- C. Therefore
- D. On the contrary
- E. Last but not the least

(え)

- A. I could
- B. I can't wait
- C. I am looking forward
- D. I had
- E. I supposed

[対話 3]

Woman 1: Hello, Jane. I just called to tell you that I got engaged.

Woman 2: (お) When will be your wedding?

Woman 1: Bob and I are planning to hold our wedding on March 3rd. I hope you could come.

Woman 2: Of course! I'll be happy to.

(お)

- A. Why not?
- B. Good for you!
- C. Certainly.
- D. I know what.
- E. You wouldn't dare.

5 以下の文章を読んで、下の問題に答えなさい。

- [1] About 15 years ago, I was invited to join a knitting group. My reluctant response — “When would I do *that*?” — was rejoined with “Monday afternoons at 4,” at a friend’s home not three minutes’ walk from my own. I agreed to give it a try.
- [2] My mother had taught me to knit at 15, and I knitted in class throughout college and for a few years thereafter. Then decades passed without my touching a knitting needle. But within two Mondays in the group, I was hooked, not only on knitting but also on crocheting*, and I was on my way to becoming a highly productive crafter.
- [3] The Craft Yarn Council reports that a third of women ages 25 to 35 now knit or crochet. Even men and schoolchildren are swelling the ranks, among them my friend’s three grandsons, ages 6, 7 and 9.
- [4] Last April, the council created a “Stitch Away Stress” campaign in honor of National Stress Awareness Month. Dr. Herbert Benson, a pioneer in mind/body medicine and author of “The Relaxation Response,” says that the repetitive action of needlework can induce a relaxed state like that associated with meditation and yoga. Once you get beyond the initial learning curve, knitting and crocheting can lower heart rate and blood pressure and reduce harmful blood levels of the stress hormone cortisol.
- [5] Since the 1990s, the council has surveyed hundreds of thousands of knitters and crocheters, who routinely list stress relief and creative fulfillment as the activities’ main benefits. Among them is the father of a prematurely born daughter who reported that during the baby’s five weeks in the neonatal intensive care unit, “learning how to knit preemie* hats gave me a sense of purpose during a time that I felt very helpless. It’s a hobby that I’ve stuck with, and it continues to help me cope with stress at work, provide a sense of order in hectic days, and allows my brain time to solve problems.”
- [6] A recent email from the yarn company Red Heart titled “Health Benefits of Crocheting and Knitting” prompted me to explore what else might be known about the health value of activities like knitting. My research revealed that the rewards go well beyond replacing stress and anxiety with the satisfaction of creation.
- [7] Betsan Corkhill, a wellness coach in Bath, England, and author of the book “Knit for Health & Wellness,” established a website, Stitchlinks, to explore the value of (あ) she calls therapeutic knitting. Among her respondents, 54 percent of those who were clinically depressed said that knitting made them feel happy or very happy. In a study of 60 self-selected people with chronic* pain, Ms. Corkhill and colleagues reported that knitting enabled them to redirect their focus, reducing their awareness of pain. She

suggested that the brain can process just so much at once, and that activities like knitting and crocheting make it harder for the brain to register pain signals. More of Stitchlinks findings are available at their website.

[8] Perhaps most exciting is research that suggests that crafts like knitting and crocheting may help to stave off a decline in brain function with age. In a 2011 study, researchers led by Dr. Yonas E. Geda, a psychiatrist at the Mayo Clinic in Rochester, Minn., interviewed a random sample of 1,321 people ages 70 to 89, most of (ろ) were cognitively* normal, about the cognitive activities they engaged in late in life. The study, published in the *Journal of Neuropsychiatry & Clinical Neurosciences*, found that those who engaged in crafts like knitting and crocheting had a diminished chance of developing mild cognitive impairment* and memory loss.

[9] Although it is possible that only people who are cognitively healthy would pursue such activities, those who read newspapers or magazines or played music did not show similar benefits. The researchers speculate that craft activities promote the development of neural pathways in the brain that help to maintain cognitive health.

[10] In support of that suggestion, a 2014 study by Denise C. Park of the University of Texas at Dallas and colleagues demonstrated that learning to quilt or do digital photography enhanced memory function in older adults. Those who engaged in activities that were not intellectually challenging, either in a social group or alone, did not show such improvements.

[11] (う) that sustained social contacts have been shown to support health and longevity*, those wishing to maximize the health value of crafts might consider joining a group of like-minded folks. I for one try not to miss a single weekly meeting of my knitting group.

(Adapted from Jane E. Brody, "The Health Benefits of Knitting," January 25, 2016. *The New York Times*. All rights reserved. Used by permission and protected by the Copyright Laws of the United States.)

NOTES

crocheting かぎ針編み preemie 未熟児 chronic 慢性的な
cognitively 認知的に impairment 障害 longevity 長命, 長生き

- (1) (あ) ~ (う) に入れるのに最も適切な語(句)を次から1つ選び、記号で答えなさい。
- (あ) A. which B. that C. the D. what E. such
- (い) A. people B. whom C. who D. them E. which
- (う) A. Consider B. Once C. Given D. Provide E. If only

(2) [7]の下線部を和訳しなさい。

(3) [8]の下線部の意味に最も近いものを次から1つ選び、記号で答えなさい。

- A. to increase or further improve the good quality, value or status of something
- B. to make something continue at the same level, standard, etc.
- C. to help something to happen or develop
- D. to increase rapidly in number or amount
- E. to prevent something bad from affecting you for a period of time

(4) 次の中から本文の内容に合っているものを3つ選び、記号で答えなさい。

- A. The author was willing to join a knitting group in the first place.
- B. The author taught herself to knit when she was in her teens.
- C. According to the passage, the fact that the repetitive action of needlework can reduce stress is supported by data such as lowered heart rate and blood pressure, and reduced blood levels of cortisol.
- D. The father of a preemie who picked up knitting while his daughter was in the neonatal intensive care unit has now quit knitting.
- E. According to Betsan Corkhill, more than half of the clinically depressed responded that knitting affected them in a positive way.
- F. According to the study by Dr. Yonas E. Geda, those who engaged in crafts like knitting and crocheting had less chance of developing mild cognitive impairment and memory loss.
- G. The researchers led by Dr. Yonas E. Geda speculate that reading and playing music as well as knitting and crocheting promote the development of neural pathways in the brain that help to maintain cognitive health.
- H. The 2014 study by Denise C. Park produced a conflicting result compared to the result in the study done by Dr. Yonas E. Geda.

数 学 (その1)

1 次の各問いに答えよ。ただし、答は結果のみを解答欄に記入せよ。

(1) 複素数 $\xi = \cos \frac{2\pi}{n} + i \sin \frac{2\pi}{n}$ について次の問いに答えよ。ただし、 n は2以上の整数とし、 i は虚数単位とする。

(1-1) $1 + \xi + \xi^2 + \xi^3 + \cdots + \xi^n$ の値を求めよ。

(1-2) 次の数列の和を求めよ。

$$\textcircled{1} \sum_{k=1}^{n-1} \cos \frac{2k\pi}{n} \qquad \textcircled{2} \sum_{k=1}^{n-1} \sin \frac{2k\pi}{n}$$

(2) 与えられたベクトル $\vec{a} \neq \vec{0}$ に対して、別のベクトル \vec{b} を取る。 \vec{b} が、 \vec{a} と垂直なベクトル \vec{c} と平行なベクトル \vec{a}_1 に分解されるとき、 \vec{c} を \vec{a} 、 \vec{b} を用いて表せ。

(3) 関数 $f(x) = \frac{3^x + 3^{-x}}{2}$ ($x \geq 0$) の逆関数を求めよ。その定義域も書け。

2

次の問いに答えよ。ただし、(1)(2)は答のみを解答欄に記入せよ。

公平なサイコロを1回振るごとに、偶数の目が出たら1(万円)獲得し、奇数の目が出たら1(万円)損失するという賭けを行う。所持金0でこの賭けを n 回繰り返した際の損益額の合計を Z_n (万円)とする。ただし、 $Z_0 = 0$ とする。

(1) $M_n = \max_{0 \leq i \leq n} Z_i$ とするとき、確率 $P(M_4 = k)$, $k = 0, 1, 2, 3, 4$ の値をそれぞれ求めよ。

ただし、 $\max_{0 \leq i \leq n} Z_i$ は $0 \leq i \leq n$ における Z_i の最大値を表す。

(2) $T_n = \#\{i \mid i = 0, 1, 2, \dots, n-1, (Z_i = 0 \cap Z_{i+1} = 1) \cup (Z_i = 1 \cap Z_{i+1} = 0)\}$ とするとき、確率 $P(T_4 = k)$, $k = 0, 1, 2, 3, 4$ の値をそれぞれ求めよ。ただし、 $\#A$ は集合 A の要素の個数を表す。

(3) 任意の k に対して $P(M_5 = k)$ と $P(T_5 = k)$ の間に成り立つ関係を求めよ。

数 学 (その2)

3 次の各問いに答えよ。ただし、答は結果のみを解答欄に記入せよ。

(1) 次のように数列 a_n を定める。

$$a_1 = 2016, a_2 = 2017, a_{n+2} = \frac{1 + a_{n+1}}{a_n} \quad (n = 1, 2, \dots)$$

(1-1) a_5 を求めよ。

(1-2) a_{2017} を求めよ。

(2) 白球 5 球, 黒球 2 球が入っている袋から, 同時に 4 球を取り出し, その中に含まれる白球の個数を X とする。

(2-1) X の平均値(期待値)を求めよ。

(2-2) X の分散を求めよ。

4 次の各問いに答えよ。答は結果のみを解答欄に記入せよ。

(1) $a + b = 1$, $a^2 + b^2 = 3$ のとき $a^7 + b^7$ の値を求めよ。

(2) 次の式の値を求めよ。

$$\sum_{k=1}^{215} \frac{1}{\sqrt[3]{(k+1)^2} + \sqrt[3]{k(k+1)} + \sqrt[3]{k^2}}$$

(3) 座標平面上の点 (x, y) が $2x^2 + xy - 5x - y^2 + 4y - 3 \geq 0$ を満たしているとき、 $x^2 + y^2$ の最小値を求めよ。

(4) 関数 $f(x) = x + a \cos x$ ($a > 1$) は $0 < x < 2\pi$ において極小値 1 を取る。この範囲における $f(x)$ の極大値を求めよ。

(5) 座標平面上の曲線 $9y^2 = (x+3)^3$ と y 軸とで囲まれた図形の周の長さを求めよ。