

平成 29 年度 入学試験問題

数 学

【注意事項】

- 1 係員の指示があるまで、問題冊子を開いてはいけません。
- 2 この問題冊子は 12 ページ、解答用紙は 4 枚あります。
- 3 落丁、乱丁、印刷の不鮮明な箇所などがあつたときは、手を挙げて係員に申し出ること。
- 4 各解答用紙(4 枚)の受験番号欄に受験番号を数字で記入すること。
- 5 解答は必ず各問題別の解答用紙の所定の欄に記入すること。
- 6 問題冊子の余白等は適宜利用してかまいませんが、どのページも切り離してはいけません。
- 7 試験終了時刻まで退室してはいけません。
- 8 解答用紙は持ち帰ってはいけません。その他は持ち帰ること。

1 (1)から(4)までの問いに答えよ。また、(5)、(6)の空欄をうめよ。ただし、 i は虚数単位である。

(1) 次の積分を求めよ。

(i) $\int_0^{\frac{\pi}{2}} e^{-x} \cos x \, dx =$

(ii) $\int_0^{\frac{\pi}{2}} \frac{\sin x}{1 + \cos x} \, dx =$

(2) a, b を実数の定数とする。3次方程式 $x^3 + ax^2 + x + b = 0$ が $2 - i$ を解にもつとき、他の解をすべて求めよ。

(3) 方程式 $\log_2 3 \cdot \log_5 x = 16 \log_5 2 \cdot \log_x 3$ を解け。

(4) $0 \leq x < \pi$ のとき、方程式 $\sin 2x + 2 \sin x = \cos x + 1$ を解け。

(5) 実数 a が2進法で $101.01_{(2)}$ 、実数 b が5進法で $101.01_{(5)}$ と表されるとき、 $a + b$ を10進法的小数で表すと である。

(6) $\vec{a} = (1, 1, 2)$ 、 $\vec{b} = (2, -1, -1)$ とする。このとき、 $|\vec{tb} - \vec{a}|$ は $t =$ のとき、最小値 をとる。

(計 算 用 紙)

(計 算 用 紙)

2 $\triangle ABC$ において、辺 AC を $3 : 2$ に内分する点を D 、線分 BD を $5 : 1$ に内分する点を P とし、直線 AP と辺 BC の交点を E とする。このとき、以下の空欄をうめよ。

(1) $\vec{AE} = k\vec{AP}$, $\vec{BE} = l\vec{BC}$ となる実数 k, l の値は $k =$,
 $l =$ である。

(2) $\vec{AP} + p\vec{BP} + q\vec{CP} = \vec{0}$ となる実数 p, q の値は $p =$,
 $q =$ である。

(計 算 用 紙)

(計 算 用 紙)

3 2つのサイコロ A, Bがある。はじめに A を投げて出た目を a とする。次に B を a 回投げて出た目の総和を b とする。以下の問いに答えよ。

(1) $b = 2$ である確率を求めよ。

(2) $b = 1$ または $3 \leq b \leq 36$ である確率を求めよ。

(3) $b = 3$ である確率を求めよ。

(4) $a = 3$ であったときに、 $b = 6$ である確率を求めよ。

(5) $b = 3$ であったときに、 $a = 3$ である確率を求めよ。

(計 算 用 紙)

(計 算 用 紙)

4 曲線 $y = \log x$ の点 $A(t, \log t)$ における接線を l 、法線を m とする。 l と y 軸の交点を B 、 m と y 軸の交点を C とする。このとき、以下の空欄をうめよ。

(1) 点 B の y 座標を t で表すと $\boxed{\text{イ}}$ であり、点 C の y 座標を t で表すと $\boxed{\text{ロ}}$ である。

(2) 線分 BC 上に点 D を $CA = CD$ となるようにとる。このとき BD を t で表すと $\boxed{\text{ハ}}$ であり、 $\lim_{t \rightarrow \infty} BD = \boxed{\text{ニ}}$ である。

(計 算 用 紙)

(計 算 用 紙)

5 関数 $f(x) = \log(x^2 + 1)$ を考える。 $y = f(x)$ のグラフを C とする。このとき、以下の問いに答えよ。(結論に至る過程も記述すること)

- (1) $f(x)$ の増減、極値、 C の凹凸、変曲点を調べて、 C を座標平面上に描け。
- (2) C の 2 つの変曲点を通る直線と C で囲まれた部分を、 y 軸のまわりに 1 回転させてできる立体の体積 V を求めよ。

(計 算 用 紙)

(計 算 用 紙)

6 a を正の定数とする。次の条件で定められる数列 $\{a_n\}$ を考える。

$$a_1 = a, \quad a_{n+1} = \frac{a_n}{a_n + 1} \quad (n = 1, 2, 3, 4, \dots)$$

以下の問いに答えよ。

- (1) a_2, a_3, a_4 を求めよ。
- (2) 一般項 a_n を推測し、それを数学的帰納法を用いて証明せよ。

(計 算 用 紙)

(計 算 用 紙)

平成 29 年度 入学試験問題

英 語

【注意事項】

- 1 係員の指示があるまで、問題冊子を開いてはいけません。
- 2 この問題冊子は、31 ページあります。
- 3 落丁、乱丁、印刷の不鮮明な箇所などがあったときは、手を挙げて係員に申し出てください。
- 4 この試験問題の解答はマーク方式になっていますので、記入の際には次のことに十分注意してください。

① HBの黒鉛筆を使用し、右のマーク例を（マーク例）参考にしていねいに記入してください。

良い例	悪い例
●	⊗ ⊘ ⊙ ⊖

② 訂正は、消しゴムできれいに消し、消しくずを残してはいけません。

③ 所定の欄以外にはマークしたり、記入したりしてはいけません。

④ 解答用紙を汚したり、折り曲げたりしてはいけません。

5 解答用紙には解答欄以外に次の記入欄がありますので、係員の指示に従って、それぞれ正しく記入し、マークしてください。

① 氏名欄

氏名及びフリガナを記入してください。

② 受験番号欄・受験番号マーク欄

受験番号を数字で記入し、さらにその下のマーク欄にマークしてください。

6 解答は、解答用紙の解答欄にマークしてください。例えば(20)と表示のある問いに対して(C)と解答する場合は、次の(例)のように解答番号(20)の解答欄のCにマークしてください。正しくマークされていない場合には、採点できないことがありますので注意してください。

(例)

解答番号	解 答 欄
(20)	(A) (B) ● (D)

- 7 問題冊子の余白等は適宜利用してかまいませんが、どのページも切り離してはいけません。
- 8 試験終了時刻まで退室してはいけません。
- 9 解答用紙は持ち帰ってはいけません。その他は持ち帰ってください。

第1問 次の会話(1)~(4)のそれぞれの空欄に入る最も適切なものを、(A)~(D)の中から一つずつ選びなさい。

(1) Person 1: _____

Person 2: I feel like eating some meat. I think I'll order the steak.

- (A) Do you want to go out for dinner with me tonight?
- (B) I'm not sure what I want to eat. What are you going to order?
- (C) What's your favorite restaurant to eat at?
- (D) I'm not hungry. Can we eat dinner together another time?

(2) Man 1: I ran into Kenji at Shinjuku Station.

Man 2: _____

- (A) Really? I heard he moved to Osaka.
- (B) Do you like to run often?
- (C) Don't worry. He was not winning.
- (D) Why are you going there?

(3) Teacher: How did you come to start learning French two years ago?

Student: _____

- (A) I know some French words.
- (B) I don't like my French class very much.
- (C) I came by bus.
- (D) I wanted to visit France.

(4) Job interviewer: Do you have experience with programming?

Student interviewee: _____

- (A) Yes, I often watch television programs.
- (B) Yes, I have taken courses in programming and software design.
- (C) I'm not sure, let me check my calendar.
- (D) Yes, I will be very happy to get more programming skills.

(5) Woman 1: _____

Woman 2: I am sorry, but he is on another line right now.

- (A) I saw Mr. Smith standing in line in front of the new restaurant.
- (B) Where did you find Mr. Smith?
- (C) I thought Mr. Smith worked here today.
- (D) May I speak to Mr. Smith, please?

(6) Woman 1: _____

Woman 2: I'd like to, but I am on a diet now.

- (A) You are so thin!
- (B) How do you make this chocolate cake?
- (C) Please help yourself to the chocolate cake.
- (D) This chocolate cake is so delicious!

(7) Teacher: Remember to submit your assignment to me by e-mail.

Student: _____

- (A) OK, maybe I won't.
- (B) I'll try not to forget.
- (C) OK, please remember.
- (D) Well, I'll remind you later.

(8) Father: _____

Son: Sorry, I will next time.

- (A) Nice job on those exams!
- (B) You stepped on my toe!
- (C) Cover your mouth when you cough!
- (D) Dinner's ready. Are you hungry?

(9) Girl: _____

Boy: Me too, I love computers.

- (A) I want to be a computer scientist when I grow up.
- (B) I hope my father sells his computer.
- (C) My computer broke so I had to throw it away.
- (D) Playing computer games is a fantastic way to spend time.

(10) Mary: Our friend should be here any minute.

Tom: _____

- (A) Yes, she should be missing.
- (B) No, she shouldn't. She can do what she wants.
- (C) I agree! She's always leaving without saying goodbye.
- (D) Well, it's about time! We've been waiting for over an hour.

第2問 次の英文(11)~(30)の下線部の意味に最も近いものを、それぞれ(A)~(D)の中から一つずつ選びなさい。

- (11) The class location alternates between two different classrooms on Monday and Thursday.
- (A) elevates
 - (B) alters
 - (C) changes
 - (D) happens
- (12) His discovery made it possible to develop more powerful computers.
- (A) finding
 - (B) intelligence
 - (C) wealth
 - (D) shuttle
- (13) We are happy to provide adequate support for your project.
- (A) endless
 - (B) priceless
 - (C) absolute
 - (D) enough
- (14) The scientist presented his work concisely.
- (A) without enough detail included
 - (B) without saying more than was needed
 - (C) without enough relevant facts
 - (D) without making any mistakes

- (15) China's economy is more dynamic than that of the United States.
- (A) idle
 - (B) energetic
 - (C) important
 - (D) active
- (16) I am merely a visitor here.
- (A) temporarily
 - (B) currently
 - (C) indeed
 - (D) only
- (17) The professor needed to give proof that the student tried to cheat.
- (A) papers
 - (B) evidence
 - (C) permission
 - (D) agreement
- (18) The two students readily agreed with each other.
- (A) incredibly
 - (B) reluctantly
 - (C) sadly
 - (D) willingly
- (19) It can be tough to suppress your true feelings.
- (A) tell
 - (B) describe
 - (C) control
 - (D) confess

- (20) I was delighted that he invited me to a movie.
- (A) shy
 - (B) happy
 - (C) unsure
 - (D) afraid
- (21) Please feel free to wear casual clothing to the party tonight.
- (A) old
 - (B) informal
 - (C) any
 - (D) light
- (22) It is rude to stare at someone you don't know.
- (A) sneeze
 - (B) point
 - (C) yell
 - (D) gaze
- (23) Playing tennis is good exercise.
- (A) learning
 - (B) research
 - (C) workout
 - (D) competition
- (24) He had to fill out many forms at the office yesterday.
- (A) complete
 - (B) create
 - (C) put in
 - (D) destroy

- (25) Whenever she visited her mother on the weekend, she brought her laundry with her.
- (A) clothes to be sewed
 - (B) clothes to be sold
 - (C) clothes to be worn
 - (D) clothes to be washed
- (26) One pound is approximately 450 grams.
- (A) altogether
 - (B) generally
 - (C) exactly
 - (D) around
- (27) His assumption was that he'd be too tired to do homework in the evening.
- (A) wish
 - (B) plan
 - (C) expectation
 - (D) mistake
- (28) I think stress management is vital for winning.
- (A) critical
 - (B) proper
 - (C) suitable
 - (D) reasonable

- (29) Most universities prohibit smoking on campus.
- (A) discourage
 - (B) discuss
 - (C) disagree
 - (D) disallow
- (30) The students do not comprehend anything the teacher says.
- (A) listen to
 - (B) understand
 - (C) repeat
 - (D) correct

第3問 次の英文(31)~(60)のそれぞれの空欄に入る最も適切なものを、(A)~(D)の中から一つずつ選びなさい。

(31) Ms. Sato cannot attend the meeting and _____ can I.

- (A) neither
- (B) either
- (C) also
- (D) as well

(32) The meeting _____ for 3 p.m. has been cancelled.

- (A) schedules
- (B) was scheduled
- (C) scheduled
- (D) scheduling

(33) Have you ever _____ any famous musician?

- (A) meet
- (B) met
- (C) meeting
- (D) being met

(34) It's been 10 years since I _____ Mark last.

- (A) see
- (B) seeing
- (C) seen
- (D) saw

- (35) I suggest you _____ the medicine before going to bed.
- (A) will take
 - (B) take
 - (C) are taking
 - (D) have taken
- (36) Mr. Brown did nothing but _____ about making money.
- (A) thinks
 - (B) to think
 - (C) think
 - (D) for thinking
- (37) This university _____ in 1950.
- (A) built
 - (B) is built
 - (C) has built
 - (D) was built
- (38) Cathy asked me _____ tell her parents her secret.
- (A) don't
 - (B) not to
 - (C) not
 - (D) to don't
- (39) You don't know what happened to him, _____ you?
- (A) are
 - (B) don't
 - (C) do
 - (D) aren't

- (40) If you worry about your health, you should stop _____ junk food.
- (A) eat
 - (B) eating
 - (C) to eat
 - (D) to eating
- (41) Next week, I _____ to the United States on a business trip.
- (A) will travel
 - (B) traveled
 - (C) traveling
 - (D) will traveling
- (42) I _____ that book many times and I love it.
- (A) have read
 - (B) am reading
 - (C) will read
 - (D) should read
- (43) The woman _____ lives upstairs is noisy.
- (A) which
 - (B) who
 - (C) what
 - (D) where
- (44) Where did you used to _____ to school?
- (A) went
 - (B) go
 - (C) going
 - (D) goes

- (45) For the past six months, she _____ to run in the marathon.
- (A) trains
 - (B) is training
 - (C) has been training
 - (D) will be training
- (46) He is the _____ reader in the whole class.
- (A) slow
 - (B) slowest
 - (C) slower
 - (D) slowly
- (47) If I were you, _____ speak to the instructor about this.
- (A) you would
 - (B) you must
 - (C) I must
 - (D) I would
- (48) _____ is a very good activity if you want to lose weight.
- (A) Swimming
 - (B) To swim
 - (C) Swim
 - (D) Go swimming
- (49) By noon, we had finished our homework, but we hadn't eaten _____.
- (A) already
 - (B) before
 - (C) until
 - (D) yet

- 50) There was too _____ rain, so the baseball game was postponed.
- (A) much
 - (B) many
 - (C) some
 - (D) very
- 51) A person who _____ an airplane is called a pilot.
- (A) is flown
 - (B) is flying
 - (C) fly
 - (D) flies
- 52) _____ began to trust each other more.
- (A) They
 - (B) It
 - (C) She
 - (D) It's
- 53) The student could not tell her _____ what had happened.
- (A) teacher of math's
 - (B) teacher in math
 - (C) math teacher
 - (D) math's teacher
- 54) The Suzuki family will travel from Tokyo _____ New York next summer.
- (A) on
 - (B) in
 - (C) at
 - (D) to

- 55) Mr. Smith was an extremely _____ athlete when he was younger.
- (A) competitive
 - (B) compete
 - (C) competitor
 - (D) competition
- 56) _____ arrival at the school caused students to lose their concentration.
- (A) Yours
 - (B) You're
 - (C) You
 - (D) Your
- 57) The girls _____ Japan last year.
- (A) have visited
 - (B) visiting
 - (C) visited
 - (D) visit
- 58) I look forward _____ you soon.
- (A) to meeting
 - (B) meeting
 - (C) meet
 - (D) to meet
- 59) Mr. Trump and Ms. Clinton verbally attack _____ all the time.
- (A) the other
 - (B) an other
 - (C) one another
 - (D) one other

(60) Please get _____ the car right away!

(A) next

(B) in

(C) out

(D) at

第4問 次の英文を読んで、問い(61)~(80)について最も適切な答えを、(A)~(D)の中から一つずつ選びなさい。

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- (61) Which of the following is the main topic of the text above?
- (A) educational uses of the Internet
 - (B) advantages and problems of using the Internet
 - (C) two basic difficulties of the Internet
 - (D) finding information on the Internet
- (62) Which of the following is NOT true?
- (A) You can receive information sent from others through the Internet.
 - (B) Information can be published on the Web.
 - (C) Using the Internet for finding information is only a positive thing.
 - (D) The Internet can be used for educational purposes.

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- (63) According to the text, which of the following is NOT true about language death?
- (A) less frequent than in the past
 - (B) difficult to imagine
 - (C) commonly found
 - (D) ongoing
- (64) What is the purpose of writing the text above?
- (A) to ask for a solution
 - (B) to persuade readers to take no action
 - (C) to give readers information
 - (D) to write about a personal experience

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- (65) According to the text, why does a problem arise when eating Boston buns?
- (A) because spicy layering is prevented
 - (B) because the morning has no tea breaks
 - (C) because the topping sticks to your hands
 - (D) because luck is necessary
- (66) According to the text, when can students enjoy Boston buns?
- (A) while visiting Boston
 - (B) before lunchtime
 - (C) during school vacation
 - (D) after washing their hands

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- (67) According to the text, why are high quality tools important?
- (A) because workplace safety is important
 - (B) because the workplace does not have accidents
 - (C) because they are well oiled
 - (D) because the tools will be blamed
- (68) Which of the following is NOT suggested in the text as a way of maintaining tools?
- (A) oiling
 - (B) blaming
 - (C) cleaning
 - (D) sharpening

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- (69) Which of the following is the main topic of the text above?
- (A) visuals assisting global communication
 - (B) communication after the global era
 - (C) visuals in instruction manuals
 - (D) gap between writers and readers
- (70) According to the text, what is the gap between writers and readers about?
- (A) visuals
 - (B) cost
 - (C) language
 - (D) education
- (71) After the text above, which of the following topics is most likely to come next?
- (A) different interpretation of visuals in different cultures
 - (B) some examples of global communication
 - (C) gap between writers and editors
 - (D) translation of documents into different languages

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- (72) According to the text, how do we usually think when solving a mathematics problem?
- (A) procedurally
 - (B) critically
 - (C) creatively
 - (D) differently
- (73) Why is solving a math problem a chance to explore creative thinking?
- (A) You always arrive at a different answer.
 - (B) You can solve it in lots of different ways.
 - (C) You often pay attention to a problem.
 - (D) You follow a certain procedure to arrive at the answer.
- (74) Which of the following is the main topic of the passage above?
- (A) history of mathematics
 - (B) theory of mathematics
 - (C) approaches to studying mathematics
 - (D) life stories of famous mathematicians

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- (75) According to the text, which learning technique is NOT mentioned in the text?
- (A) computer-assisted language learning
 - (B) imagining what words look like
 - (C) reviewing often
 - (D) making learning enjoyable
- (76) According to the text, which of the following makes spelling difficult?
- (A) finding ways to identify long and difficult words by sight
 - (B) silent students who challenge hardworking teachers
 - (C) the impact of regular revision for very young learners
 - (D) strange groups of letters
- (77) According to the text, how is it possible for young students to learn difficult words?
- (A) as a result of good luck or fortune
 - (B) through subdivision and other combinations
 - (C) through regular use of silent letters
 - (D) by using the various strategies that good teachers share

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- (78) According to the text, what mistaken idea do some parents have?
- (A) They think their children's ability is higher than it really is.
 - (B) They hope for healthy social development.
 - (C) They believe that homework should be done regularly.
 - (D) They complete assignments for their children.
- (79) According to the text, why might parents' praise have a negative effect?
- (A) It prevents the completion of everyday assignments.
 - (B) It helps children to do their homework.
 - (C) It might cause children to be too confident about their ability.
 - (D) It forces children to go out into the world.
- (80) Based on the text, which of the following statements is NOT true?
- (A) The number of geniuses is increasing because of positive social trends.
 - (B) Sometimes, parents give compliments to their children.
 - (C) The affection of parents for their children is a positive thing.
 - (D) It can be shocking for some children when they go out into the world.

第5問 次の英文を読んで、(81)~(85)・(91)~(95)の、それぞれの空欄に入る最も適切なものを、(A)~(D)の中から一つずつ選びなさい。

また、問い(86)~(90)・(96)~(100)について最も適切な答えを、(A)~(D)の中から一つずつ選びなさい。

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- 81) (A) restaurants
(B) fast food
(C) kitchens
(D) waiters
- 82) (A) areas
(B) countryside
(C) ages
(D) tables
- 83) (A) unpopular
(B) company
(C) automobile
(D) well-known
- 84) (A) waitresses
(B) cars
(C) menus
(D) customers
- 85) (A) difficult
(B) available
(C) sweeter
(D) unpopular

According to the text, answer the following questions:

- (86) How long has fast food been eaten?
- (A) decades
 - (B) millennia
 - (C) ages
 - (D) centuries
- (87) Which item is NOT mentioned as fast food?
- (A) pizza
 - (B) french fries
 - (C) curry
 - (D) fish and chips
- (88) Before the 19th century, where was cooked seafood available?
- (A) near the sea
 - (B) apartment buildings
 - (C) drive-in restaurants
 - (D) marketplaces
- (89) When did the names of fast food companies become famous?
- (A) during the 1940s, 1950s, and 1960s
 - (B) right after the First World War
 - (C) with the increase of cars
 - (D) in the 19th century

- (90) What fast-food business idea became very common between 1940 and 1970?
- (A) pancakes
 - (B) vending machines
 - (C) street vending
 - (D) opening chains

この部分に掲載されている文章については、著作権上の問題から公表することができません。

- 91 (A) space
(B) sea
(C) land
(D) human
- 92 (A) successful
(B) dangerous
(C) unlucky
(D) eventful
- 93 (A) vacation
(B) drive
(C) journey
(D) cruise
- 94 (A) the earth
(B) the moon
(C) Apollo
(D) space
- 95 (A) success
(B) journey
(C) mission
(D) disaster

According to the text, answer the following questions:

- 96) When is it most likely that Project Mercury began?
- (A) 1959
 - (B) 1950
 - (C) 1970
 - (D) 1972
- 97) What was the goal of Apollo 13?
- (A) to travel around the moon
 - (B) to survive a disaster
 - (C) to return to earth
 - (D) to land on the moon
- 98) What goal of Apollo 13 was NOT achieved?
- (A) the men could not land on the moon's surface
 - (B) the spacecraft had to go around the far side of the moon
 - (C) Project Apollo had to end
 - (D) the spacecraft was not going in the right direction
- 99) What event prevented the spacecraft from landing on the moon?
- (A) severe conditions on board
 - (B) an oxygen tank explosion
 - (C) a three-day journey to the moon
 - (D) launching the Apollo spacecraft

000 What was the most impressive accomplishment of the Apollo 13 trip to the moon?

- (A) the oxygen tank exploded
- (B) they were able to return to earth
- (C) the mission had to be aborted
- (D) Kennedy Space Center is located in Florida.