平成26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ったときは、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) 次の積分を求めよ。ただし、積分定数は省略してもよい。
(i) \( \int \frac{dx}{x (\log x)^2} = \) イ
(ii) \( \int_{\sqrt{\pi}}^{\pi} x \sin x \, dx = \) ロ
(iii) \( \int_{0}^{\frac{\pi}{2}} \cos 2x \cos x \, dx = \) ハ

(2) 次の極限を求めよ。
\[ \lim_{n \to \infty} \left( \sqrt{n(n+3)} - n \right) = \) ニ

(3) \( 3^x = 5^x = 15^x \) をみたす実数 \( x, y \) について、\( \frac{1}{x} + \frac{1}{y} = \) ホである。

(4) 2点 \( A(-1, 0), B(2, 0) \) からの距離の比が1：2である点 \( P(x, y) \) の軌跡を表す曲線の方程式は \( \) ヘである。

(5) 2つのベクトル \( \vec{a} = (2, 3, 2), \vec{b} = (1, 0, -2) \) の両方に垂直で、大きさが1であるベクトルは \( \) ツと \( \) チである。

（計算用紙）
$E$ を 2 次の単位行列、$O$ を 2 次の零行列とする。正の実数 $a$ に対して、行列

\[ A = \begin{pmatrix} 1 & -a \\ a & 1 \end{pmatrix} \]

が

\[ A^2 - 2A + 4E = O \]

をみたすとき、以下の問いに答えよ。

(1) $a$ を求めよ。イ

(2) $A^3$ を求めよ。ロ

(3) $A^8$ を求めよ。ハ

(計算用紙)
四角形 ABCD において, AB = 5, BC = 3, CD = 5, ∠BCD = 120° であり,対角線 BD は∠ABC を 2 等分している。このとき, 以下の空欄をうめよ。

(1) BD = □ □ である。

(2) ∠ABD = ∠CBD = θ とするとき, sin θ = □ □ である。

(3) 四角形 ABCD の面積は □ □ である。

(計算用紙)
2つの袋A, Bがある。袋Aには白玉が2つと, 赤玉, 青玉, 黒玉が1つずつ。合計5つの玉が入っている。袋Bには白玉と赤玉が1つずつ, 青玉が3つの合計5つの玉が入っている。このとき, 以下の問いに答えよ。

(1) 袋Aと袋Bから1つずつ玉を取り出すとき, 同じ色になる確率を求めよ。

(2) 袋Aと袋Bから1つずつ玉を取り出すとき, 異なる色になる確率を求めよ。

(3) 袋Aからは1つ, 袋Bからは3つ同時に玉を取り出すとき, その4つの玉の色が2色以上になる確率を求めよ。

(4) 袋Aから2つ同時に玉を取り出し, 袋Bからも2つ同時に玉を取り出すとき, その4つの玉の色がすべて異なる確率を求めよ。

(計算用紙)
（計算用紙）
5 平面の実数の定数とする。関数 \( f(x) = -x^3 + 3x^2 + ax + b \) について、以下の問いに答えよ。

（結論に至る過程も記述すること。）

(1) \( f(x) \) が極大値と極小値をもつための条件を求めよ。

(2) \( f(x) \) が \( x = p \) で極大、\( x = q \) で極小となり、かつ \( p^2 + q^2 = 10 \) が成り立つとする。このとき、\( a, p, q \) の値を求めよ。

(3) (2)において、方程式 \( f(x) = 0 \) が異なる 3 つの実数解をもつための条件を求めよ。

（計算用紙）
（計算用紙）
6  $n$ を自然数とするとき、$7^{n-1} + 2^{n+1}$ は 5 の倍数であることを数学的帰納法によって証明せよ。

（計算用紙）
（計算用紙）
平成26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、26ページもあります。
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ること。
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）
       参考にしていなさいに記入してください。
   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)

<table>
<thead>
<tr>
<th>解答番号</th>
<th>解答欄</th>
</tr>
</thead>
<tbody>
<tr>
<td>(20)</td>
<td>A B C D</td>
</tr>
</tbody>
</table>

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。その他は持ち帰ること。

◇M1(212-1)
第1問 次の会話(1)〜(4)の空欄に入る最も適切なものを、それぞれ(A)〜(D)の中から一つずつ選びなさい。

(1) Man: __________________
Woman: I haven’t heard, but it looks like rain.
(A) What’s the weather going to be like?
(B) Have you heard of a group called Carol?
(C) Did you say it rained today?
(D) Can you hear that drum music?

(2) Steve: It’s a bad day to be driving.
Steve’s mother: __________________
(A) Here are the keys. Enjoy yourself.
(B) Do you know how to drive?
(C) I don’t have a choice. I have to get to work by 6:00.
(D) My driving is too bad!

(3) Person at the beach: __________________
Lifeguard: Not when the waves are this high.
(A) Look how high the waves are!
(B) Is it safe to go in now?
(C) What time does the beach close?
(D) Was the beach closed yesterday?

(4) 1st sports fan: __________________
2nd sports fan: They have a good chance at the championship.
(A) Did you have a chance to get tickets to the tournament?
(B) Do you know the winner of last night’s game?
(C) What do you think about the Giants this season?
(D) Who do you think will win the tournament?
(5) Tennis player: __________________________

Opponent: Let's play one more game. I think I can beat you this time.

(A) How many games are there in a set?
(B) Had enough punishment for one day?
(C) You're a better player than me today.
(D) Where did you buy your racket?

(6) Customer: __________________________

Store clerk: I'm afraid we have only a limited number of sizes.

(A) Did I frighten you? I'm sorry.
(B) Where is the food court?
(C) How does this look on me?
(D) Do you have anything larger than this?

(7) Woman at the door of a restaurant: __________________________

Restaurant manager: Sorry, but our restroom is only available to customers.

(A) Do you have a ladies' room I could use?
(B) Are you a long-time customer?
(C) Are you feeling sorry about something?
(D) How late are you open tonight?

(8) Teacher: __________________________

Student: I'll do any kind of extra assignment you want. Please, this is important to my future.

(A) What kind of job will you be doing after you graduate?
(B) I want to do an extra assignment during the holiday.
(C) Why should I agree to change your final grade?
(D) What is your class next period?
Tourist: __________________

Local resident: No, you have to go back into town and turn left on Highway 41.

(A) Are you leaving town permanently?
(B) Should I go back and turn on Highway 41?
(C) Is this the road to Maple Grove?
(D) Will you give me directions to Maple Grove?

Bellboy: __________________

Hotel customer: That's okay. I can manage on my own.

(A) I'd like to become manager of this hotel.
(B) Let me take that for you.
(C) Do you own that luggage?
(D) I'd like a meal now.
第2問 次の英文(1)～(4)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。

(1) He will donate to the charity this year.
   (A) get used to
   (B) take advantage of
   (C) make a living from
   (D) give money to

(2) The soup gradually cooled on the table.
   (A) finally
   (B) slowly
   (C) nearly
   (D) instantly

(3) Clean air and water are products of forests, and vital to life.
   (A) visible
   (B) alternative
   (C) critical
   (D) promising

(4) One of the important problems that society faces is a shortage of nurses and doctors.
   (A) number
   (B) lack
   (C) result
   (D) surplus
15. The villagers **organized** a trip to the museum.
   (A) ruined
   (B) attended
   (C) arranged
   (D) suggested

16. There has been **rapid** growth in the price of oil recently.
   (A) fast
   (B) expensive
   (C) serious
   (D) dangerous

17. The scientists discovered a new **method** in computer science.
   (A) technique
   (B) fortune
   (C) weapon
   (D) concern

18. Due to heavy rain, the truck driver could **hardly** see anything.
   (A) scarcely
   (B) virtually
   (C) certainly
   (D) actually

19. Immigrants had to **adapt** to the new environment.
   (A) get accustomed to
   (B) become fond of
   (C) stay out of
   (D) come across
20 She took charge of her family business while her parents were on vacation.
(A) became responsible for
(B) brought up
(C) was delighted with
(D) depended on

21 There is a large movement against discrimination on the basis of race in that country.
(A) corruption
(B) justice
(C) bias
(D) equality

22 The mayor's speech was interrupted by a rainstorm.
(A) delivered
(B) infected
(C) dismissed
(D) disturbed

23 The fee for admission to the Museum of Modern Art rose by 10%.
(A) increase
(B) penalty
(C) charge
(D) test

24 Tom was criticized for his selfish acts by his classmates.
(A) complimented
(B) punished
(C) blamed
(D) praised
25. Mr. Laroux specializes in **commercial** law.
   (A) business  
   (B) industrial  
   (C) patent  
   (D) criminal

26. She made a lot of **progress** on her homework assignment.
   (A) profit  
   (B) knowledge  
   (C) influence  
   (D) improvement

27. The baseball game is **under way** already.
   (A) has been introduced  
   (B) has started  
   (C) has been canceled  
   (D) has ended

28. The teacher **collected** the homework assignments.
   (A) rejected  
   (B) gathered  
   (C) demanded  
   (D) provided

29. The **inhabitants** of the small village have never seen foreigners.
   (A) customers  
   (B) leaders  
   (C) warriors  
   (D) residents
The committee decided to raise the taxes.

(A) council
(B) president
(C) judge
(D) company
第3問 次の英文(31)～(34)の空欄に入る最も適切なものを、それぞれ(A)～(D)の中から一つずつ選びなさい。

   (A) has been
   (B) was
   (C) being
   (D) had

32) My sister likes playing basketball and so _____ my brother.
   (A) is
   (B) does
   (C) has
   (D) do

33) I am sorry that I _____ come to your birthday party last night.
   (A) shouldn't
   (B) can't
   (C) was unable to
   (D) would

34) _____ member of staff is required to attend the meeting.
   (A) All
   (B) Almost
   (C) Every
   (D) Everyone
35) I remember _____ baseball with my friends when I was in Los Angeles.
   (A) to play
   (B) have played
   (C) had played
   (D) playing

36) Where do you want to go _____ you are in the United States?
   (A) while
   (B) during
   (C) whereas
   (D) among

37) We haven’t heard anything from Sandy from the time we _____ from high school.
   (A) graduated
   (B) have graduated
   (C) will graduate
   (D) graduate

38) He doesn’t like pizza, _____?
   (A) is he
   (B) yes and no
   (C) does he
   (D) isn’t he

39) I don’t like this sweater. Could you show me _____?
   (A) ones
   (B) other
   (C) another
   (D) different
(40) _____ is sometimes hard for adults.
   (A) Life
   (B) A life
   (C) The life
   (D) Lives

(41) Because tobacco is bad for your health, you should stop _____.
   (A) to smoking
   (B) smoking
   (C) to smoke
   (D) smoke

(42) My friend spent _____ of yen at the new shopping mall yesterday.
   (A) 20 thousands
   (B) a thousand
   (C) thousand
   (D) thousands

(43) The annual workshop of my company is usually _____ in December.
   (A) holds
   (B) holding
   (C) held
   (D) to hold

(44) Lots of information _____ available on this topic.
   (A) are
   (B) is
   (C) being
   (D) has
45. So far, I ____ France five times, including my last trip to Paris.
   (A) visit
   (B) was visiting
   (C) have visited
   (D) had visited

46. I recommend that you finish your project ____ next Thursday.
   (A) until
   (B) by
   (C) in
   (D) unless

47. I once had a friend ____ mother was born in Moscow, Russia.
   (A) his
   (B) who
   (C) who's
   (D) whose

48. What would you do if you ____ a million dollars?
   (A) win
   (B) have won
   (C) won
   (D) are winning

49. My brother is looking for a better job because he can't afford ____.
   (A) that he travels
   (B) to travel
   (C) he travels
   (D) to traveling
The questions during the interview were difficult _____.
(A) answer  
(B) answered  
(C) of answering 
(D) to answer

I will let you ____ about the result of your interview later. 
(A) know  
(B) to know  
(C) knowing  
(D) knew

At the end of this street, ____ a very big amusement park. 
(A) theirs  
(B) it is  
(C) it has  
(D) there is

Because of the strong wind yesterday, many bicycles were ____ damaged. 
(A) serious  
(B) seriously  
(C) hard  
(D) hardly

As a college student, I want to read _____. 
(A) as possible as many books  
(B) as many as books possible  
(C) as many as possible books  
(D) as many books as possible
55 I ______ many news articles yesterday.
    (A) read
    (B) write
    (C) review
    (D) find

56 Do you believe that unemployment is related ______ technological advancements?
    (A) from
    (B) at
    (C) by
    (D) to

57 Would you like ______ cake?
    (A) little
    (B) many
    (C) some
    (D) a few

58 Why ______ to go to college?
    (A) you decided
    (B) did you decided
    (C) did you decide
    (D) you did decide

59 He looks very tired. He ______ have been awake all night.
    (A) must not
    (B) should
    (C) must
    (D) could not
Most Japanese cars in the United States _____ in America.

(A) manufacture

(B) manufactured

(C) are manufactured

(D) are manufacturing
第4問 次の英文を読んで、問(6)～(8)について最も適切な答えを、それぞれ(A)～(D)の中から一つずつ選びなさい。

In modern times, it is sometimes hard to imagine what music sounded like long ago. One man has made it his mission to reconstruct the musical instruments of the Maori, a group of people who have lived in New Zealand since before European settlement. Maori instruments have fascinated Richard Nunns ever since he first saw them. He has devoted his life to preserving these beautiful cultural treasures. This is a great service to New Zealand.

(6) Which of the following is not mentioned in the paragraph?
(A) cultural treasures
(B) musical instruments
(C) fascinating settlement
(D) service

(62) According to the paragraph, to what has Richard Nunns dedicated his life?
(A) imagining music
(B) preserving Maori instruments
(C) images of Maori music
(D) the presumption of cultural treasures

(63) According to the paragraph, when did Richard Nunns begin to be interested in Maori instruments?
(A) centuries ago
(B) all his life
(C) when he first saw them
(D) before European settlement
64. According to the paragraph, where is Alcatraz prison?
(A) on a South American island
(B) on Alcatraz Island
(C) at the San Francisco tourism center
(D) on the east coast of America

65. According to the paragraph, some of the inmates in the Alcatraz prison included:
(A) movie stars
(B) police force
(C) dangerous animals
(D) notorious gangsters and murderers

66. According to the paragraph, what was another name for the Alcatraz prison?
(A) Felon
(B) Maximum-security facility
(C) The Rock
(D) Federal prison
(67) According to the paragraph, Hurricane Katrina is known as:
   (A) the deadliest hurricane ever
   (B) the most destructive Atlantic tropical cyclone ever
   (C) the sixth strongest Atlantic hurricane
   (D) a U.S. hurricane in the Indian Ocean region

(68) According to the paragraph, at least how many people died in Hurricane Katrina?
   (A) 1,833 million
   (B) 1,833
   (C) 81 billion
   (D) 1928

(69) According to the paragraph, what was the deadliest hurricane to hit the United States before Hurricane Katrina?
   (A) the 1928 Okeechobee hurricane
   (B) the 2005 Atlantic hurricane
   (C) the 1992 Hurricane Andrew
   (D) the 2009 Indian Ocean hurricane
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。

(70) According to the paragraph, what is the altitude of Bishkek?
   (A) 4,855 meters
   (B) 800 feet
   (C) 800 meters
   (D) 15,928 feet

(71) According to the paragraph, the word Bishkek comes from a Kyrgyz word meaning:
   (A) Tian Shan mountain
   (B) the largest city
   (C) a type of drink
   (D) a fruit

(72) According to the paragraph, where is Bishkek located?
   (A) off the southern fringe of Tian Shan mountain
   (B) near the northern fringe of the Kyrgyz Ala-Too range
   (C) along the Siberian railway
   (D) off the northern fringe of Chuy province
According to the paragraph, which statement below most appropriately describes the location of the Sydney Opera House?

(A) close to the Sydney Harbour Bridge
(B) far from Bennelong Point
(C) in Farm Coves
(D) inside the Royal Botanic Gardens

According to the paragraph, the Sydney Opera House is famous as:

(A) a central business district
(B) a Royal Botanic Garden
(C) a performing arts center
(D) a multi-venue sports facility

New Zealanders are known around the world as “Kiwis” after their country’s national bird. It is said that there are more sheep than people in the country today. Large farmlands are home to millions of sheep. The wool of these animals is shaved off using a tool called shears. Kiwi shearers are thought to be the fastest in the world.
(75) According to the paragraph, what is the name of the tool used to cut sheep’s wool?

(A) shearsers
(B) Kiwi shearsers
(C) shears
(D) shaved off

(76) According to the paragraph, from which animal is wool shaven by shearsers?

(A) sheep
(B) kiwis
(C) Kiwi shearsers
(D) possums

(77) The main topic of the above paragraph is:

(A) American colleges and universities
(B) foreign nations
(C) popularity of cricket in the U.S.
(D) second-generation immigrants
According to the paragraph, cricket in American universities is mostly played by:

(A) first-generation immigrants from the U.K.
(B) first- or second-generation migrant workers
(C) first- or second-generation immigrants from Pakistan and Canada
(D) first- or second-generation immigrants from countries including India and Pakistan

According to the paragraph, what are the two most important challenges to the Mars mission?

(A) cost and health risks
(B) baggage and passenger weight
(C) lack of energy and money
(D) travel time and aliens

According to the paragraph, what has not been mentioned as a health threat in the human mission to Mars?

(A) the cost of sending people to Mars
(B) exposure to high-energy cosmic rays
(C) negative effects of a low-gravity environment
(D) loss of eyesight
Ancient people have often created (81) buildings as tombs for their dead rulers. For example, the ancient Egyptians built large four-sided stone tombs known as pyramids. A pyramid is a (82) shape formed by connecting four polygonal bases of a square and a point, called the apex. Each base edge and apex forms a triangle. The ancient Egyptians believed that the shape and size of the pyramid would help to (83) the soul of the dead ruler into the home of the gods.

In the (84) world of the Greeks, the Great Pyramid of Khufu, at Giza, Egypt, was already two thousand years old. At that time, it was a popular tourist site for Greek tourists. Ancient Greek tourists had travel (85) that described the seven great wonders of the world. These (86) included other large buildings, statues, and gardens. The Great Pyramid of Khufu, at Giza, (87), was listed as one of the seven wonders. Of those seven wonders, the (88) at Giza is the only one to have survived. One of the reasons for its (89) is the size of the building.

Herodotus was a famous Greek historian who (90) the Great Pyramid of Khufu. Egyptian guides told him that it had taken twenty years to build the pyramid. The entire structure consists of 2,300,000 blocks of stone, each averaging 2.5 tons in weight. For 3,800 years, the Great Pyramid of Khufu was the world's tallest building. Even today, the Great Pyramid of Khufu is still the world's largest building.
33. (A) linger  (B) laugh  (C) launch  (D) lump

34. (A) modern  (B) recent  (C) ancient  (D) model

35. (A) guidebooks  (B) diseases  (C) movies  (D) documentaries

36. (A) winters  (B) worlds  (C) waters  (D) wonders

37. (A) Egyptian  (B) Egypt  (C) Khufu  (D) tourist

38. (A) animal  (B) garden  (C) statue  (D) pyramid

39. (A) size  (B) creation  (C) structure  (D) survival

40. (A) built  (B) believed  (C) visited  (D) created
The ancient history of Scandinavian people is ___90___ in the Sagas. These stories tell about early Viking sea voyages, battles that occurred during the voyages, migration from Norway to Iceland, and difficulties in Iceland. The Sagas were written mainly in Iceland in the Old Norse language. The word "saga" comes from the Old Norse or Icelandic language. The saga texts are ___92___ that describe the adventures of heroes who were often Vikings. Usually the ___93___ are realistic, but sometimes they are romanticized and fantastic. However, the Sagas always tell about the lives of human beings in Europe that modern readers can ___94___.

One example of a saga is the story of Leif Ericson, a Norse explorer who lived from 970 to 1020. Thorvald Asvaldsson was Leif Ericson's ___95___. Thorvald Asvaldsson was sent away from Norway and had to settle in Iceland with his boy, Erik the Red. (Erik had red hair). Later, Leif Ericson was born to Erik the Red and his wife there in ___96___. Following that, Erik the Red and his family left Iceland and traveled to Greenland, where they established the ___97___ Norse colonies in 986, and where Leif grew up to become a young man.

When Leif was a young man, he was ___98___ by his father to go on voyages of discovery. According to the Icelandic Sagas, Leif Ericson built a Norse settlement on the northern tip of Newfoundland, Canada. Leif Ericson is ___99___ to be the first ___100___ to reach North America. He did this nearly 500 years before Christopher Columbus.
91. (A) moved  
   (B) driven  
   (C) fined  
   (D) written

92. (A) battles  
   (B) sacred  
   (C) stories  
   (D) exciting

93. (A) mangoes  
   (B) sagas  
   (C) ancient  
   (D) boats

94. (A) understate  
   (B) unnerve  
   (C) understand  
   (D) underdo

95. (A) nephew  
   (B) father  
   (C) uncle  
   (D) grandfather

96. (A) Iceland  
   (B) Newfoundland  
   (C) Greenland  
   (D) Norway

97. (A) fictional  
   (B) fast  
   (C) first  
   (D) fake

98. (A) enraged  
   (B) encouraged  
   (C) concerned  
   (D) killed

99. (A) believe  
   (B) believed  
   (C) believer  
   (D) belied

100. (A) Asian  
      (B) woman  
      (C) African  
      (D) European