고려대학교 세종캠퍼스 2016학년도 수시 학업능력고사 (오후형)

영 어 영 역 (20 문항)

1. 다음 글에서 빈칸에 들어갈 말로 적절한 것은?

Have you ever seen a leopard cat? If you're lucky, you can see them among Korean wildlife. The leopard cat is a small wild cat. They have well-defined webs between toes and longer legs than domestic cats. Leopard cats are solitary, except during breeding season. Some are active during the day, but most hunt at night. They feed on small rodents such as rats and mice. Leopard cats are hunted mainly for their fur. Although commercial trade has been reduced, the species continues to be hunted for fur. In Korea, the leopard cat is listed as a critically endangered species and has been the focus of a(n) _____ program.

① evaluation

② prevention

③ projection

④ conservation

⑤ termination

2. 다음 글을 쓴 목적으로 가장 적절한 것은?

Many theatergoers have been offered lots of good plays including *West Side Story*, *The King and I*, and *Dracula* for several decades. However, they have hardly ever seen new works recently because many producers have avoided making a new play. Part of the reason may be the tremendous cost of making a new production these days. It is true that many producers asked to invest a few hundred thousand dollars in a production have preferred a play of proven merit and past success to a new, untried play. That sounds like a reasonable excuse but, in fact, this practice can lead to an undesirable situation. Unless new plays are given a chance today, there will be nothing to revive in the future.

① Advertise

② Alarm

③ Compare

④ Dispute

⑤ Identify

3. 다음 글에 드러난 필자의 심경 변화로 가장 적절한 것은?

"I could never possibly do it," I said. I meant it, Seriously! My sister Pilar had been describing how much she loved scuba diving. We were spending two weeks at the beach and she had just finished her initial underwater dive. She raved about the brightly colored coral, the anemones, the turtles, and even the shark that she had observed.

"It's like another world down there, James," said Pilar. "There's the world on dry land and the world beneath the water; the only way you can see that world is by putting on a scuba mask and oxygen tank. It's not actually dangerous. You get trained on the proper usage of the equipment and the instructor is always present. If an emergency occurs, you're completely prepared."

"I don't care about another world," I replied, "I don't want to be eaten by sharks and what if I run out of oxygen? I'm a dry-land type of guy."

"My sister is very persistent, however, and before the first week was up, I was enrolled in scuba instruction against my will. Pilar was waiting when I surfaced from my first dive. "Well?" she said. "Wow, Pilar. It is another world!" I shouted.

① scared   →   excited

② nervous   →   indifferent

③ confident   →   proud

④ terrified   →   confused

⑤ regretful   →   content

4. 다음 글의 빈칸에 들어갈 말로 가장 적절한 것은?

If there is half a spoon of sugar in your tea and someone puts in another half, you will notice that it is a lot sweeter. However, if you already have six spoons of sugar in your tea and someone puts another half a spoon in, you are unlikely to notice the difference. Likewise, if you are comparing the weight of two envelopes, you will be able to detect a difference of as little as a fraction of an ounce. But if you are comparing two boxes weighing around fifty pounds each, you may not notice a difference unless it is a pound or more. _____, the stronger the initial stimulus, the greater the additional intensity needed for the second stimulus to be perceived as different.

① Nonetheless

② In other words

③ On the other hand

④ Meanwhile

⑤ For example

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5. 다음 글의 밑줄 친 부분 중, 문맥상 낱말의 쓰임이 적절하지 <u>않은</u> 것은?

Nowhere do we show our emotions more than on our faces. It is not difficult to explain why our facial expressions change in response to environmental (a)<u>stimuli</u> or how this may be evolutionarily adaptive. Recent research, (b)<u>for example</u>, has proved insight into how two facial expressions, fear and disgust, moderate our reception of sensations coming from the outside world. When we are (c)<u>terrified</u>, our eyes widen and our nostrils flare to help us see and smell more of our surroundings, just as the ears of a dog perk up when it hears something interesting. (d)<u>Similarly</u>, when we are disgusted, such as by an offensive odor, our noses wrinkle and our eyes narrow to reduce the impact. Air intake increases when we are afraid and decreases when we are (e)<u>pleased</u>.

① (a)

② (b)

③ (c)

④ (d)

⑤ (e)

6. (A), (B)의 각 네모 안에서 문맥에 맞는 낱말로 가장 적절한 것은?

The question of how much weight is harmful for your health is, in fact, harder to answer than you might think. To think merely in terms of weight (A) exaggerates / complicates / oversimplifies the issue of body fatness and health. Two people of the same sex, age, and height may both weigh the same, yet one may be too fat and the other too thin. The difference lies in their body (B) composition / progression / association . One may have small, light bones, minimally developed muscles and too much body fat, while the other has big, heavy bones, well developed muscles and too little body fat. For example, football players and athletes may technically be overweight for their height according to the weight tables. However, they typically have less body fat than would pose a health risk. Likewise, many office workers who weigh in as "normal" may actually be too fat.

	(A)		(B)
①	exaggerates	······	composition
②	exaggerates	······	progression
③	complicates	······	association
④	oversimplifies	······	composition
⑤	oversimplifies	······	progression

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7. 다음 글의 밑줄 친 부분 중, 어법상 틀린 것은?

Ernest Hemingway developed a way of writing (a) <u>which</u> he would write a story and then omit several pages at the beginning, theorizing that something omitted can affect the reader as if it (b) <u>were</u> there. The same theory applies to an interviewee's preparation. Even though you do not discuss all you know about the company and the person (c) <u>conducting</u> the interview, you will convey a sense of knowledge during the interview. Your knowledge obtained through your preparation, even though (d) <u>unstated</u>, will have a presence and will affect the interview and the feeling developed by the interviewer. (e) <u>Just as</u> a person with power doesn't have to say, "I am powerful," you don't have to say, "I know a lot about you and your company."

① (a)

② (b)

③ (c)

④ (d)

⑤ (e)

8. 다음 글의 빈칸에 들어갈 말로 가장 적절한 것은?

As a teenager, Benjamin Franklin seemed to think he wrote well enough, but then one day his father found an exchange of letters between Benjamin and a friend, John Collins, arguing a point back and forth. The argument was whether women should be educated, Collins contending they were naturally unable to learn as much as men, Franklin taking the other side. Benjamin's father, Josiah Franklin, first told his son what was good about his letters; they were better than Collins' in spelling and punctuation. Then he told him and showed specifically how they were inferior: "in elegance of expression, in method and perspicuity, of which he convinced me by several instances," as Franklin recalled. We must note that when it comes to giving people evaluations — _____ — old Josiah Franklin could be a model for us all.

* perspicuity: 명료함

① encouraging and discouraging them at the same time

② giving advice first, but rejecting the offer of specific information

③ offering praise first, then supporting criticism with examples

④ analyzing the arguments first, then pointing out mistakes

⑤ mentioning their strong points, and finding the effects of praise

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9. 다음 글의 요지로 가장 적절한 것은?

Peer mediation programs are a popular example of a restorative program in schools. Peer mediators are usually nominated by peers or teachers because they are respected and trusted by their peers and have demonstrated leadership and communication skills. Students come to mediation voluntarily, and peer mediators guide them through a process that moves from blaming each other to developing and committing to solutions that are acceptable to all parties: Peer mediation programs have been found to be effective in improving student attitudes toward conflict, increasing understanding of nonviolent problem-solving methods, and enhancing communication skills. They have also reduced the number of school suspensions for fighting and improved students' ability to manage conflicts.

① 학교에는 학생들의 관계회복을 위한 많은 프로그램이 있다.

② 또래 중재 프로그램은 학생들의 갈등 조정 능력 향상에 효과적이다.

③ 또래 중재 프로그램에서 중재자는 추천에 의해 선발되어야 한다.

④ 교내 관계회복 프로그램에는 학생들의 자발적 참여가 필요하다.

⑤ 중재자의 해결책은 당사자들이 받아들일 때 효과적이다.

10. 다음 글의 주제로 가장 적절한 것은?

In the early 1990s Norway introduced a carbon tax on emissions from energy, and it did seem to encourage environmental innovation. However, unexpected circumstances came when they tried to apply this approach globally. Agreeing on international taxes on emissions was notoriously hard, as we already know that the European Union has experienced terrible difficulties in trying to regularize the complex and myriad differences in its members' sales taxes. Besides, although Sweden, Finland, and Denmark barely decided to introduce carbon taxes during the 1990s, they have not harmonized their approaches with Norway or with each other. If such similar countries can't come to an agreement, there is little hope for doing so with the vastly more diverse countries in the rest of the world.

① 환경보호 정책의 일환으로서 탄소배출에 대한 과세의 정당성

② 탄소배출에 대한 일괄 과세의 부당성과 불합리성

③ 탄소배출에 대해 과세하는 국가들의 이기주의

④ 탄소배출에 대한 과세문제에서 국제적 합의도출의 어려움

⑤ 각 국가들의 탄소배출에 대한 서로 다른 과세 정책

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11. 다음 글에서 필자가 주장하는 바로 가장 적절한 것은?

Power is usually associated with luxury and wealth. But Mohandas Ghandi, one of the great leaders of the last century, proved that an ascetic life can be a source of power too. Ghandi led the movement that brought India and Pakistan independence from Great Britain. Ghandi lived simply and even wove the cloth for his clothes. A vegetarian who sometimes fasted to make political statements, Ghandi refused to injure any living thing. Ghandi used nonviolent resistance against oppression. When he and his followers were attacked, they simply refused to fight back. In this way, they maintained personal dignity and showed the justice of their cause. Ghandi was assassinated in 1948, but his principles continue to inspire nonviolent change throughout the world.

① 권력에는 반드시 부와 호사가 수반된다.

② Ghandi의 비폭력주의 정신을 기려야 한다.

③ 채식가인 Ghandi는 생물을 소중히 생각했다.

④ Ghandi는 비폭력 저항으로 자신의 위엄을 지켰다.

⑤ 절제하는 삶을 통해서도 진정한 지도자가 될 수 있다.

12. 글의 흐름으로 보아, 주어진 문장이 들어갈 가장 적절한 곳은?

> Paper, for example, is biodegradable in small amounts, but if too much is thrown away, the excess will not be broken down and may harm the environment.

As our society becomes increasingly concerned about excessive waste, the word biodegradable has become more popular. (a) Many companies now claim that products are biodegradable. (b) However, the word, strictly interpreted, should mean "not harmful to the environment." (c) Food may be biodegradable, but if it is buried in a landfill, it will often be preserved rather than being naturally reprocessed. (d) Claims are made by companies that certain plastics are biodegradable. (e) However, many of these plastics simply break down into smaller particles and cannot be transformed into naturally occurring elements. The best way to ensure a healthy environment is to produce less garbage by recycling and reusing products.

① (a)

② (b)

③ (c)

④ (d)

⑤ (e)

13. 다음 글에서 전체 흐름과 관련이 <u>없는</u> 문장은?

Some people prefer to organize information in a logical way. (a) They respond more easily to people's thoughts and are more analytical. (b) If you are such a person, emotions play less of a part in your life, decisions, and interactions with others. (c) You like an environment with little competition and with opportunity to respond more personally. (d) You work best if you can organize and outline a subject, know your objectives and goals, get to the task, and receive rapid feedback. (e) You are most motivated when you can see logical reasons for studying certain material or working on a particular project. You probably prefer teachers who are task-focused, logical, well-organized, less emotional, and generous with feedback.

① (a)

② (b)

③ (c)

④ (d)

⑤ (e)

14. 다음 글의 내용을 한 문장으로 요약하고자 한다. 빈칸, (A)와 (B)에 들어갈 말로 가장 적절한 것은?

Since group performance in problem solving is superior to even the individual work of the most expert group members, it should not be surprising that students learn better when they cooperate. However, there is one issue that needs further consideration. Specifically, the technique of having students help one another raises the question of whether students with lower ability are being helped at the expense of those with higher ability. Is this true? Not quite. Knowledge, happily, is not a zero-sum product. Higher-ability students can reinforce their own knowledge by teaching those with lower ability. In addition to that benefit, helping lower-ability students often pulls higher-ability students to a more sophisticated understanding of the material. The cliché that teachers learn as much as their pupils is certainly true.

In problem solving, students can benefit from (A) _____ as lower-level students can learn from higher-level students and the latter can (B) _____ their understanding and knowledge by coaching the former.

	(A)		(B)
①	contradiction	……	fortify
②	collaboration	……	fortify
③	collaboration	……	moderate
④	contribution	……	combine
⑤	contribution	……	moderate

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[15-17] 다음 글을 읽고 물음에 답하시오.

Eliza Yellow Bird sits in bleachers surrounded by fans yelling nasty comments at the Fighting Sioux hockey team of the University of North Dakota. The 12-year-old tries to ignore the shouts, but every insult feels like a punch in the stomach.

"They'll yell, The Sioux stink. The Sioux are losers," says Eliza, who is a Native American. "It makes me feel angry because it's like they're saying it against the Sioux tribe and all Indians."

Eliza is among thousands of Native Americans and others who are speaking out against sports teams that use Indian logos, nicknames, and mascots. They say that these symbols — along with "Indian" war chants and halftime dances — mock, or make fun of, their culture. They say that images of Indians wearing face paint and feathers are stereotypes. A stereotype is an overtly simple picture or opinion of a person, group or thing.

"_____," says Christine Munson, co-chair of the Youth Indian Mascot and Logo Task Force, an organization fighting to get rid of Indian mascots and logos from Wisconsin public schools. "We don't live in tepees. We don't always walk around with feathers in our hair. We're police officers, lawyers, professors, and business owners."

15. 윗글의 제목으로 가장 적합한 것은?

① Native Americans' Effort to Keep Tradition

② Native Americans' Struggle for Freedom

③ Native Americans' Request for Better Jobs

④ Native Americans' Attempt to Ignore Stereotypes

⑤ Native Americans' Fight against Prejudices

16. 윗글의 빈칸에 들어갈 말로 가장 적절한 것은?

① Stereotypes keep people from seeing who Native Americans are today

② Stereotypes give Native Americans an opportunity to earn money

③ Stereotypes force Native Americans to forget who and what they are

④ Stereotypes make people understand Native Americans' identity better

⑤ Stereotypes stimulate Native Americans to organize their own sports teams

17. 윗글에서 추론할 수 있는 것은?

① 미국 원주민 어린이들은 법률가, 교수, 또는 사업가 등 더 좋은 직업을 원한다.

② 많은 미국 스포츠 팀이 미국 원주민의 전통을 존중하여 원주민 부족의 이름을 사용하고 있다.

③ 많은 미국 원주민들은 일반 고정관념과는 달리 보통 미국인들처럼 살고 있다.

④ 미국 원주민들은 의복, 풍습, 머리모양과 같은 생활양식이나 전통을 유지하기 위하여 노력한다.

⑤ 미국 원주민들은 자신들에 대한 일반적인 고정관념 때문에 고유의 생활양식을 바꾸려고 한다.

[18~20] 다음 글을 읽고 물음에 답하시오.

(A)

My mom and dad got separated when I was 5. Two years later my mom sold a lot of her belongings just so we'd be able to pay our bills and have some food on the table. She sold some very personal items, including the piano (a) she had been given by her mother.

(B)

Without her knowing it, I contacted the owner of that piano and told her I wanted to buy it for my mom. I had very little in savings — what money I'd made cutting grass, working in people's yards, and doing little odd jobs. But that lady wanted my mom to have the piano and said she would take what I had in savings, even though it was much less than what (b) she could have sold it to someone else for. So I emptied out my savings and brought that piano home. My buddies and I sneaked it into the house when my mom was gone and set it right next to the Christmas tree.

(C)

I can still see her face when she came through the door. Her eyes got great big and we all yelled "Surprise!" But she just stood there. I finally said, "Well, come on down and play us something." I'll never forget that moment as my mom sat down at (c) her piano with tears in her eyes and played, "Blue Eyes Crying in the Rain" by Willie Nelson. That was a perfect Christmas morning.

(D)

My mom played music by ear, and really had a gift and a love for the piano. Selling that instrument was a huge sacrifice. I vowed that someday I would make it up to (d) her. Ten years had passed since then. My mom cleaned houses for a living. One of the homes she cleaned had a piano and that was the only place she had an opportunity to play. One day around Christmas, I came home from school and found my mom crying. The people who owned that piano had put it up for sale and (e) she was devastated.

18. 주어진 글 (A)에 이어질 내용을 순서에 맞게 배열한 것으로 가장 적절한 것은?

① (B) – (D) – (C)   ② (C) – (B) – (D)

③ (C) – (D) – (B)   ④ (D) – (B) – (C)

⑤ (D) – (C) – (B)

19. 밑줄 친 (a)~(e) 중에서 가리키는 대상이 나머지 넷과 다른 것은?

① (a)
② (b)
③ (c)
④ (d)
⑤ (e)

20. 위 글의 내용과 일치하지 않는 것은?

① 어머니는 재능과 애정에도 불구하고 생계를 위해 피아노를 팔았다.

② 어머니는 청소 일을 하는 집에서 피아노를 연주할 수 있었다.

③ 필자는 힘들게 일해 번 돈으로 어머니를 위해 피아노를 샀다.

④ 필자는 출생 이후 줄곧 어머니와 단둘이 힘들게 살았다.

⑤ 어머니가 받은 피아노는 자신이 일하는 집에서 아들이 구입한 것이었다.

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수 학 영 역 (20 문항)

1. $\log_3 15 - \log_3 5\sqrt{7} + \frac{1}{2}\log_3 21$의 값은?

① $\frac{3}{2}$ ② 2 ③ $\frac{5}{2}$ ④ 3 ⑤ $\frac{7}{2}$

2. $\lim_{x \to \infty}(\sqrt{x^2-2x}-x)$의 값은?

① -4 ② -3 ③ -2 ④ -1 ⑤ 0

3. 행렬 $A = \begin{pmatrix} -3 & 2 \\ 1 & -2 \end{pmatrix}$와 실수 k에 대하여 연립방정식 $A\begin{pmatrix} x \\ y \end{pmatrix} = k\begin{pmatrix} x \\ y \end{pmatrix}$가 $x = y = 0$ 이외의 해를 갖도록 하는 모든 실수 k값들의 합은?

① -7 ② -6 ③ -5 ④ -4 ⑤ -3

4. $x = (\sqrt{2}+1)^{\frac{1}{3}} - (\sqrt{2}-1)^{\frac{1}{3}}$ 일 때, $x^3 + 3x$의 값은?

① 2 ② 3 ③ 4 ④ 5 ⑤ 6

5. 주머니 A에는 흰 공 3개와 검은 공 1개가 들어있고, 주머니 B에는 흰 공 3개와 검은 공 2개가 들어있다. 주머니 A에서 임의로 1개의 공을 꺼내고 주머니 B에서는 연속해서 임의로 2개의 공을 꺼낸다. (단, 꺼낸 공은 다시 넣지 않는다.) 이렇게 뽑은 3개의 공 중에서 검은 공이 1개만 있을 확률은?

① $\dfrac{9}{20}$ ② $\dfrac{21}{40}$ ③ $\dfrac{3}{5}$ ④ $\dfrac{27}{40}$ ⑤ $\dfrac{3}{4}$

6. 그래프 G의 각 꼭짓점 사이의 연결 관계를 나타내는 행렬 M이 다음과 같을 때, 옳은 것만을 <보기>에서 있는 대로 고른 것은?

$$M=\begin{pmatrix} 0 & 1 & 1 & 0 & a \\ 1 & 0 & 1 & 1 & 1 \\ 1 & 1 & b & 1 & 0 \\ 0 & c & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{pmatrix}$$

<보기>
ㄱ. $a+b+c=3$
ㄴ. 변의 개수는 7개이다.
ㄷ. 3개의 변이 연결된 꼭짓점의 개수는 2개이다.

① ㄱ　　　② ㄴ　　　③ ㄷ

④ ㄴ, ㄷ　　　⑤ ㄱ, ㄴ, ㄷ

7. 방정식 $\dfrac{x+a}{x-1}=x^2$ (단, $x\neq1$)이 서로 다른 3개의 실수해를 갖기 위한 a값의 범위는?

① $-2<a<\dfrac{14}{27}$　　　② $-2<a<\dfrac{17}{27}$

③ $-1<a<\dfrac{5}{27}$　　　④ $-1<a<\dfrac{7}{27}$

⑤ $0<a<\dfrac{14}{27}$

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8. 삼차함수 $f(x)$가 다음 조건을 만족한다.

　(가) $f(x)$를 $x+1$로 나눈 나머지와
　　　$(x-1)(x-2)$로 나눈 나머지가 같다.
　(나) 곡선 $y=f(x)$ 위의 점 $(1, f(1))$에서의
　　　접선의 방정식은 $y=-2x+1$이다.

함수 $f(x)$에 대해서 옳은 것만을 <보기>에서 있는 대로 고른 것은?

<보기>
ㄱ. $f(x)$를 $x-2$로 나눈 나머지는 -1이다.
ㄴ. $f(x)$의 삼차항의 계수는 1이다.
ㄷ. $f(x)$의 y절편은 음의 값이다.
ㄹ. $f(x)$의 극값을 가지는 x 값들의 하나는
　　$x<0$, 다른 하나는 $x \geq 0$의 범위에
　　존재한다.

① ㄱ, ㄴ　　　　　② ㄴ, ㄷ

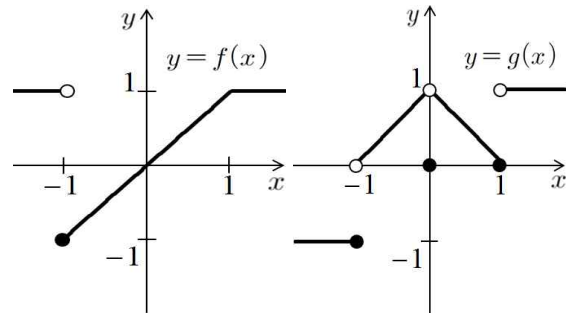③ ㄱ, ㄴ, ㄷ　　　④ ㄱ, ㄴ, ㄹ

⑤ ㄱ, ㄷ, ㄹ

9. 두 수열 $\{a_n\}$, $\{b_n\}$에 대하여

$$\sum_{n=1}^{\infty}\left(\frac{a_n}{n^2}-\frac{5n}{3n-1}\right)=7$$

$$\sum_{n=1}^{\infty}\left(\frac{3n^2}{n^2+n-1}+2b_n\right)=10 \text{일 때,}$$

$$\lim_{n\to\infty}\left(\frac{3a_n}{n^2}-2b_n\right)\text{의 값은?}$$

① 4　　　② 5　　　③ 6　　　④ 7　　　⑤ 8

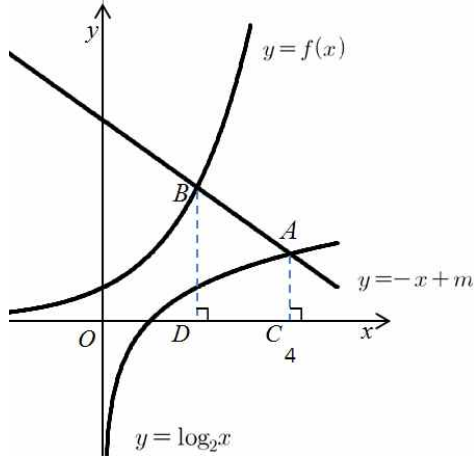10. 두 함수 $f(x)$, $g(x)$의 그래프가 다음 그림과 같을 때, 옳은 것만을 <보기>에서 있는 대로 고른 것은?

<보기>
ㄱ. $\displaystyle\lim_{x\to 0} g(f(x))=0$
ㄴ. $\displaystyle\lim_{x\to -1} g(f(x))=0$
ㄷ. $\displaystyle\lim_{x\to\infty} g\left(f\left(1+\frac{2}{x}\right)\right)=0$

① ㄱ　　　　② ㄴ　　　　③ ㄷ

④ ㄱ, ㄷ　　　⑤ ㄴ, ㄷ

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11. 그림과 같이 곡선 $y = \log_2 x$가 $x = 4$에서 직선 $y = -x + m$과 만나는 점을 A라고 하고, 이 곡선의 역함수 $y = f(x)$와 이 직선이 만나는 점을 B라고 하자. 두 점 A, B에서 x축에 내린 수선의 발을 각각 C, D라 할 때, 사각형 $ABDC$의 넓이의 값은?

① 5 　　② 6 　　③ 7 　　④ 8 　　⑤ 9

12. x의 2차방정식 $ax^2 - 2ax + 1 = 0$의 두 근 α, β가 $\log_2 \alpha - \log_2 \beta = \log_2 a - 2$를 만족할 때, a의 값은?

① $\dfrac{7}{6}$ 　② $\dfrac{6}{5}$ 　③ $\dfrac{5}{4}$ 　④ $\dfrac{4}{3}$ 　⑤ $\dfrac{3}{2}$

13. 삼차함수 $f(x)$가 다음 조건을 만족한다.
   (가) $f(0) > 0$이다.
   (나) $f(x) = 0$을 만족하는 양의 실근은 $x = a$ 단 하나이다.
   (다) $x \le 0$인 모든 x에 대해서 $f(x) > 0$이다.
   (라) $f(x)$는 $x = -b$ (단, $b > 0$)에서 양의 극솟값을 갖는다.

함수 $F(x) = \displaystyle\int_{-b}^{x} f(t)\,dt$ 에 대해서 옳은 것만을 <보기>에서 있는 대로 고른 것은?

<보기>
ㄱ. $x > 0$인 모든 x에 대하여 $F(x) > 0$이다.
ㄴ. $F(0) > 0$이다.
ㄷ. $F(x) = 0$을 만족하는 어떤 x값이 $x < a$인 범위에서 존재한다.
ㄹ. $F(x) < 0$을 만족하는 어떤 x값이 $x > a$인 범위에서 존재한다.

① ㄱ, ㄴ 　　　　② ㄱ, ㄹ

③ ㄴ, ㄷ 　　　　④ ㄱ, ㄴ, ㄹ

⑤ ㄴ, ㄷ, ㄹ

14. 함수 $f(x) = x^3 + ax^2 - 3x - b$가 다음 조건을 만족한다. (단, a, b는 상수이다.)

(가) $f(1) = 1$

(나) $\displaystyle \lim_{x \to 2} \frac{1}{x^2 - 4} \int_2^x f(t)dt = 5$

이때, $a + b$의 값은?

① 5 　② 6 　③ 7 　④ 8 　⑤ 9

15. 어느 공장에서 생산되는 과자 1봉지의 무게는 평균이 20g, 표준편차가 5g인 정규분포를 따른다고 한다. 이 공장에서 생산한 과자 중에서 임의로 선택한 1봉지의 무게가 23g 이하일 확률과 임의로 선택한 4봉지의 무게의 평균이 Ag 이하일 확률이 같을 때, A의 값은?

① 21.5　② 22.0　③ 22.5　④ 23.0　⑤ 23.5

16. 연주는 2016년 1월 초에 가격이 2,000만원 하는 승용차를 구입하려고 한다. 모아놓은 돈으로 1,000만원을 지불하고 부족한 1,000만원에 대해서는 2년 상환조건으로 대출을 받아 지불할 예정이다. 연주는 그 대출금을 2016년도 1월부터 매월 말에 a원씩 24개월에 걸쳐 갚으려고 할 때 a의 값은? (단, 월이율 1%의 복리로 계산하며, $1.01^{24} = 1.25$로 계산한다.)

① 40만원　② 45만원　③ 50만원

④ 55만원　⑤ 60만원

17. 함수
$$f(x) = \begin{cases} x(x-2)(x-a), & x \geq 1 \\ bx^2+1, & x < 1 \end{cases}$$
가 $x=1$에서 미분 가능할 때, $a+b$의 값은?
(단, a, b는 상수이다.)

① -3 ② -2 ③ -1 ④ 0 ⑤ 1

18. 다음은 $n \geq 2$인 모든 자연수 n에 대하여 부등식
$$1+\frac{1}{3^2}+\frac{1}{5^2}+\cdots+\frac{1}{(2n-1)^2} < \frac{3n}{2n+1} \quad \cdots ㉮$$
이 성립함을 수학적 귀납법으로 증명하는 과정이다.

| 증명 |

(i) $n=2$일 때, (좌변)$=1+\frac{1}{3^2}$, (우변)$=1+\frac{1}{5}$
이므로 ㉮가 성립한다.

(ii) $n=k$ (k는 2이상의 자연수)일 때 ㉮가 성립한다고 가정하면
$$1+\frac{1}{3^2}+\frac{1}{5^2}+\cdots+\frac{1}{(2k-1)^2} < \frac{3k}{2k+1} \quad \cdots ㉯$$
이다. ㉯의 양변에 (ㄱ)을 더하면
$$1+\frac{1}{3^2}+\frac{1}{5^2}+\cdots+\frac{1}{(2k-1)^2}+(ㄱ) < \frac{3k}{2k+1}+(ㄱ)$$
이다. 이때,
$$\left\{\frac{3k}{2k+1}+(ㄱ)\right\}-\frac{3k+3}{2k+3} = \frac{(ㄴ)}{(2k+1)^2(2k+3)} < 0$$
이므로
$$\frac{3k}{2k+1}+(ㄱ) < \frac{3k+3}{2k+3}$$
이다. 그러므로
$$1+\frac{1}{3^2}+\frac{1}{5^2}+\cdots+\frac{1}{(2k-1)^2}+(ㄱ) < \frac{3(k+1)}{2(k+1)+1}$$
이다.
따라서 $n=k+1$일 때도 ㉮가 성립한다.

(i), (ii)에 의하여 $n \geq 2$인 모든 자연수 n에 대하여 ㉮가 성립한다.

위의 증명에서 (ㄱ), (ㄴ)에 알맞은 식을 각각 $f(k), g(k)$라 할 때, $f(2)g(2)$의 값은?

① $-\dfrac{8}{25}$ ② $-\dfrac{6}{25}$ ③ $-\dfrac{4}{25}$

④ $-\dfrac{2}{25}$ ⑤ $-\dfrac{1}{25}$

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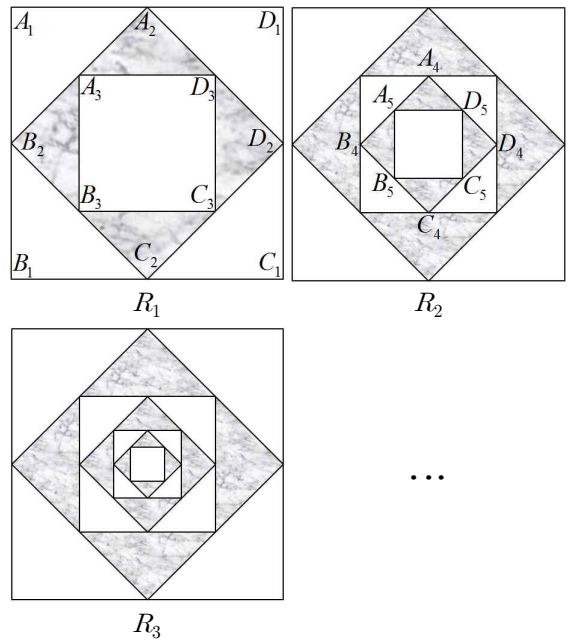19. 수직선 위를 움직이는 두 점 P, Q의 시각 t $(0 \le t \le 5)$일 때의 위치는 각각

$$f(t) = t^3 - 3t^2, \quad g(t) = 3t^2$$

이다. 출발 후 두 점 P, Q의 속도가 같아지는 순간은 $t = a$이고, 두 점 P와 Q가 서로 반대 방향으로 움직이는 것은 b초 동안일 때, $a + b$의 값은?

① 4　　② 5　　③ 6　　④ 7　　⑤ 8

20. 한 변의 길이가 4인 정사각형 $A_1 B_1 C_1 D_1$에서 그림과 같이 네 변의 중점을 꼭짓점으로 하는 정사각형 $A_2 B_2 C_2 D_2$를 그린 후, 정사각형 $A_2 B_2 C_2 D_2$의 네 변의 중점을 꼭짓점으로 하는 정사각형 $A_3 B_3 C_3 D_3$을 그린다. 정사각형 $A_2 B_2 C_2 D_2$의 내부와 정사각형 $A_3 B_3 C_3 D_3$의 외부의 공통부분에 색칠하여 얻은 그림을 R_1이라고 하자.

그림 R_1에서 정사각형 $A_3 B_3 C_3 D_3$의 네 변의 중점을 꼭짓점으로 하는 정사각형 $A_4 B_4 C_4 D_4$를 그린 후, 정사각형 $A_4 B_4 C_4 D_4$의 네 변의 중점을 꼭짓점으로 하는 정사각형 $A_5 B_5 C_5 D_5$를 그린다. 정사각형 $A_4 B_4 C_4 D_4$의 내부와 정사각형 $A_5 B_5 C_5 D_5$의 외부의 공통부분에 색칠하여 얻은 그림을 R_2라고 하자. 이와 같은 과정을 계속하여 n번째 얻은 그림 R_n에 색칠되어 있는 부분의 넓이를 S_n이라 할 때, $\lim_{n \to \infty} S_n$의 값은?

① 4　　② $\dfrac{16}{3}$　　③ $\dfrac{36}{5}$　　④ 8　　⑤ $\dfrac{64}{7}$