2018년 11월 강사평가

163회차

2018년 11월 강사시험 및 강의평가

김 래 형 T

1. [미적분-2]

실수 전체의 집합에서 정의된 미분 가능한 함수 $f(x)$가 다음 조건을 만족시킨다.

> (가) $f(0) = 1$
>
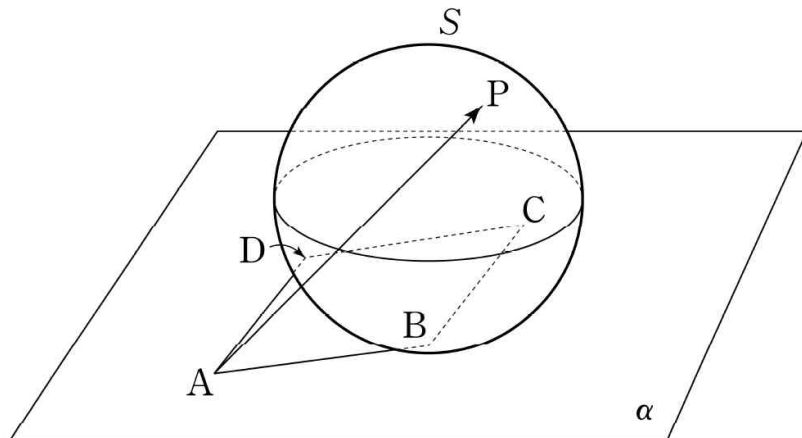> (나) 함수 $f'(x)$는 음이 아닌 실수 전체의 집합에서 연속이고, $x \geq 0$인 모든 실수 x에 대하여 $f'(x) \geq 0$이다.

양수 t에 대하여 $0 \leq x \leq t$에서 곡선 $y = f(x)$의 길이를 $l(t)$라 하면 모든 양수 t에 대하여 함수 $l(t)$는 $l(t) - t = \int_0^t xf'(t-x)dx$를 만족시킨다. 함수 $f(x)$의 역함수를 $g(x)$라 할 때, $\int_{g(2)}^{g(4)} g'(f(x))dx$의 값은?

2. [기하와 벡터]

그림과 같이 평면 α 위에 길이가 4인 선분 AB가 있고, 반지름의 길이가 3인 구 S가 점 B에서 평면 α에 접한다. 구 S 위의 두 점 C, D에 대하여 사각형 $ABCD$는 넓이가 8인 평행사변형이다. 구 S 위의 점 P에 대하여 $\overrightarrow{AP} \cdot (\overrightarrow{AC} + \overrightarrow{AD})$의 최댓값을 구하시오.

1. [확률과 통계]

집합 $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$ 에서 임의로 $k\,(2 \leq k \leq 10\,)$ 개의 원소를 선택할 때, 이 원소가 연속하는 자연수일 확률을 P_k라 한다. 〈보기〉에서 옳은 것을 모두 고르면?

〈보 기〉

ㄱ. $P_2 = \dfrac{2}{11}$ ㄴ. $P_k = P_{12-k}$

ㄷ. P_k 중에서 최솟값은 P_{10} 이다.

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2. [미적분-2]

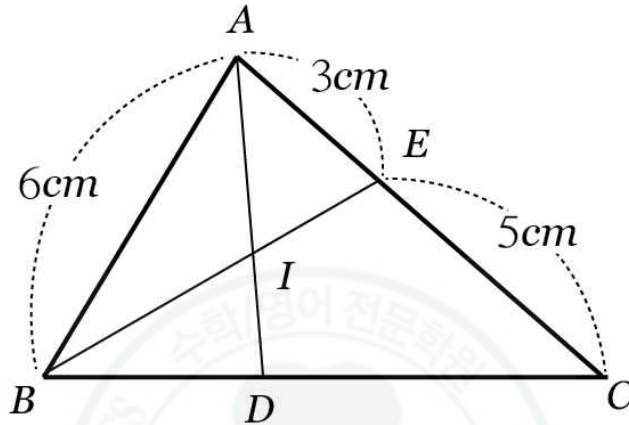2 이상의 자연수 n에 대하여 실수 전체의 집합에서 정의된 함수 $f(x) = e^{x+1}\{x^2 + (n-2)x - n + 3\} + ax$가 역함수를 갖도록 하는 실수 a의 최솟값을 $g(n)$이라 하자. $1 \leq g(n) \leq 8$을 만족시키는 모든 n의 값의 합은?
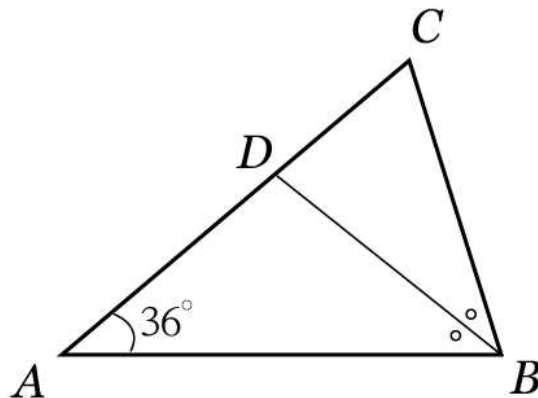
1. [중2수학-하]

$\triangle ABC$에서 점 I는 $\triangle ABC$의 내심이고, $\overline{AB} = 6\,\text{cm}$, $\overline{AE} = 3\,\text{cm}$, $\overline{EC} = 5\,\text{cm}$일 때, $\overline{BD}$의 길이를 구하시오.

2. [중3수학-하]

$\overline{AB} = \overline{AC}$인 이등변삼각형 ABC에서 $\angle A = 36°$이고, $\angle ABD = \angle DBC$일 때, $\cos 36°$의 값을 구하시오.

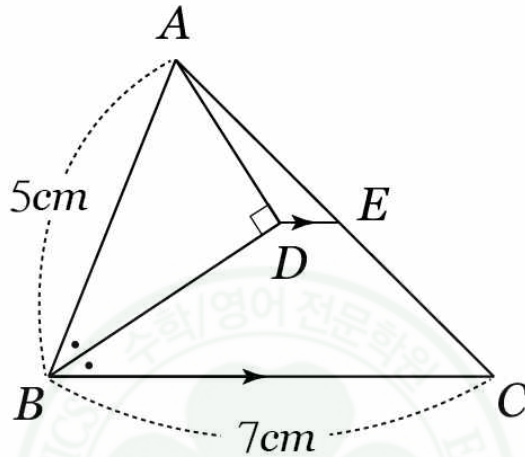**1.** [중3수학-하]

반지름의 길이가 각각 9cm, 4cm인 두 원 A, B가 서로 외접하고 있다. 이 두 개의 원에 한 개의 직선이 각각 P, Q에서 접할 때, 두 원 A, B에 외접하고, 직선 PQ 위의 점 T에 접하는 원 C의 반지름을 구하시오.

2. [고등수학-하]

두 집합 $A = \{1, 2, 3, 4\}$, $B = \{2, 3, 4, 5\}$에 대하여 두 함수 $f : A \rightarrow B$, $g : B \rightarrow A$가 다음 조건을 만족시킨다.

> (가) $f(3) = 5$, $g(2) = 3$
>
> (나) 어떤 $x \in B$에 대하여 $g(x) = x$이다.
>
> (다) 모든 $x \in A$에 대하여 $(f \circ g \circ f)(x) = x + 1$이다.

$f(1) + g(3)$의 값은?

1. [중2수학-하]
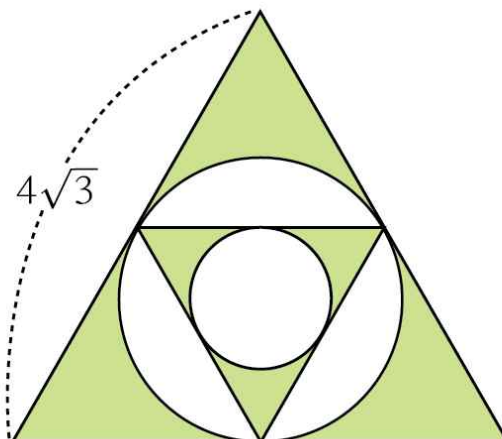
$\triangle ABC$에서 점 A에서 $\angle B$의 이등분선에 내린 수선의 발을 D라 한다.
$\overline{BC}//\overline{DE}$, $\overline{AB}=5cm$, $\overline{BC}=7cm$일 때, $\triangle ABC : \triangle ADE$를 구하시오.

2. [중3수학-하]

한 변의 길이가 $4\sqrt{3}$인 정삼각형에 내접하는 원을 그리고 그 원에 내접하는 삼각형을, 그 삼각형에 내접하는 원을 반복하여 그린 것이다. 색칠된 부분의 넓이를 구하시오.

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최 민 근 T

1. [고등수학-하]

두 집합 $A=\{x|0\le x\le 4\}$, $B=\{x|2\le x\le 4\}$에 대하여 함수 $f:B\to B$와 함수 $g:A\to A$는 다음 조건을 만족시킨다.

> (가) $f(x)=\sqrt{-2x+8}+2$　　(나) $g(f(x)-2)=f(f(x))$
>
> (다) $g(f(x))=6-f(f(x))$

방정식 $g(g(x))=g(x)$를 만족시키는 모든 실수 x의 개수를 a, 모든 실수 x의 값의 합을 b라 할 때, $a+b$의 값은?

2. [미적분-2]

실수 전체의 집합에서 이계도함수를 갖는 함수 $f(x)$가 다음 조건을 만족시킨다.

> (가) $f(0)=0$　　　　(나) 실수 전체의 집합에서 $f'(x)>0$
>
> (다) $x<1$에서 $f''(x)>0$이고, $x>1$에서 $f''(x)<0$이다.

함수 $f(x)$의 역함수를 $g(x)$라 하고, 실수 전체의 집합에서 정의된 함수 $h(x)=\displaystyle\int_0^x \{f(t)-g(t)\}dt$가 $h'(1)=h'(2)=0$을 만족시킬 때, [보기]에서 옳은 것만을 있는 대로 고르면?

───── 〈 보 기 〉 ─────

ㄱ. 함수 $h(x)$는 열린구간 $(0,1)$에서 감소한다.

ㄴ. $\displaystyle\int_1^2 \{f(t)-t\}dt=\dfrac{h'(c)}{2}$ 인 실수 c가 열린구간 $(1,2)$에서 적어도 하나 존재한다.

ㄷ. 곡선 $y=h(x)$는 열린구간 $(0,2)$에서 적어도 두 개의 변곡점을 갖는다.

1. [고1 응용어법]

다음 밑줄 친 부분들의 체크포인트를 설명하고 <u>어법 혹은 문맥상</u>으로 에러를 찾아 수정하시오.

(A) The "sharing economy" is a system based on the idea of individuals to rent things from each other through the Internet. Things now commonly rented in this way include houses, cars, boats, and power tools. These items are too expensive for many people to buy but are owned by others who are willing to share them for a price. This collaborative use of resources has several positive effects. Owners make money from the things they own, and renters pay less than ①<u>they do</u> if they bought the things themselves or rented them from a company such as a hotel or car rental agency. The environment also benefits because sharing a product with others rather than buying the product for yourself means fewer resources are consumed in making products.

(B) There's a big difference between a patent and a trademark, but most people dont know what it is. Typically granted for a period of seventeen years, patents protect both a products name and the method for manufacturing it. For instance, the electric razor was patented in 1928 by inventor Jacob Schick. He did this so he could have complete control over his creation. On the other hand, trademarks are names or symbols that are used to identify products and give them a distinct identity in the minds of consumers. Kleenex and Jell-O are examples of trademarks, ②<u>so is the lions head</u> that represents MGM Pictures. Aware of the power of trademarks to promote their products, companies work very hard to protect them and ③<u>keep other enterprises using them without permission</u>.

(C) Routines ④<u>are different than habits and rituals</u>. Habits are repetitive behaviors that individuals perform without conscious thought. Behavioral habits are done automatically and typically involve a restricted range of behaviors. For example, a child may have a habit of sucking on the end of her blanket when going to sleep. A routine, in contrast, involves a sequence of highly ordered steps. A child's bedtime routine might include taking a bath, brushing his or her teeth, reading a book, saying prayers, and then sucking on the end of a blanket before going to sleep. Rituals, on the other hand, tend to be more symbolic and linked to emotional bonds within the family. They often provide continuity across generations and are unique and meaningful to the family. A routine has the ability to become a ritual when it is repeated over time and takes on symbolic meaning.

1. [중3 응용어법]

다음 글의 흐름상 밑줄 친 곳에 <u>문맥상 혹은 어법상 어색한 부분</u>이 있는 것을 골라 수정하시오.

(A) If you can think of it, you can find it in Cyberspace. From health, computers and garden information to purchasing automobiles to books and games – it's all out there. Pick any business and there is a 90 percent chance that they have a website. You can even find friends you ①<u>haven't spoken</u> since high school. The only downside is having to spend so much time locating the appropriate website. A lot of time is wasted when looking for something specific. Search engines can lead you in the right direction.

(B) Some people get tired of conventional western medicine. So they turn to alternative methods and go to places such as the Herbal Pharmacist, a new pharmacy specializing in patient counseling and preventative healthcare. Witnessing a growing interest in all–natural products from his customers, druggist David Hillman decided to pursue the science behind the herbs. It is David's belief that if you give the body what it needs, it will take care of itself. Following David's advice, his parents let food be their medicine and ②<u>medicine is their food</u>.

(C) As you can guess, the climate of the Antarctic is very ③<u>different from Korea.</u> First, the Antarctic is the coldest place in the world. Its average temperature is −34℃, but it drops to −80℃ in winter. In this low temperature, glass or cans break from the cold. What's more, the wind sometimes blows so strongly that people cannot stand up. Snow is another problem. Once, we were stuck inside for a week because of the snow.

By now, you must be curious about why we are here in this unfriendly environment, right? From a scientific point of view, the Antarctic is a very important place for research. We are here so that we can study air and ocean currents in the Antarctic. They're important because changes in the currents affect climate change all over the globe. In addition, the Antarctic is a great place to study astronomy. ④<u>This is why</u> the days and nights here each last for almost six months. Here, you can see stars nearly all day for six months!

The Antarctic is called a treasure house because it is filled with lots of natural resources. This is another reason that around 20 countries, including Korea, have bases here. In 1959, a number of countries agreed to protect and make use of the Antarctic together. Since then, an increasing number of countries have joined the agreement.

1.

[고3-고2 응용어법]

다음 글의 흐름상 밑줄 친 곳에 문맥상 혹은 어법상 어색한 부분이 있는 것을 골라 수정하시오.

[고3]

(A) The ancient Greeks, living long ago, in an age before the treadmill, did their walking outdoors. They did everything outdoors. A house was less a home than a dormitory. They spent only about thirty waking minutes there every day. They spent the rest of their day in the agora, the marketplace, working out at the gymnasium or the palaistra, the wrestling grounds, or perhaps strolling along the rolling hills that surround the city. ①None of these outings deemed extracurricular because, unlike us, the Greeks didn't differentiate between physical and mental activity Plato's famous Academy, progenitor of the modern university, ②was as a much athletic facility as an intellectual one. The Greeks viewed body and mind as two inseparable parts of a whole. A fit mind not attached to a fit body rendered both somehow incomplete. Picture Rodin's Thinker and you have the Greek ideal: a muscular man lost in thought.

(B) In my teaching of multiple texts in history, I first ask students ③how it is that historians do. My research suggests that students begin to answer that question in a way that assumes historians to be nothing more than documenters. They believe historians write down exactly what happened. In the discussion, however, they soon come to realize that that is an inadequate description— because historians search for many different accounts of what happened, and they begin to view them as synthesizers. Some subsequently start to shift their opinions to note that historians need to judge the accuracy of accounts— thus they believe historians act as arbiters. If they keep on discussing the issue, some will even come to recognize that historians have their own viewpoints and biases that influence their final interpretation.

[고2]

Our modern equivalent to the use of music in coordinating agricultural labour is the provision of music in factories. Opinion is divided as to its effects. Judging from its use in agriculture, one might expect that music would improve the performance of the routine operations which are common in factory work. Repetitive movements are less tedious when synchronized with musical rhythms. The provision of music is certainly popular amongst factory workers. However, the heightening of morale is not necessarily accompanied by increase in output. Whilst music probably enhances the performance of routine tasks, especially those in which repetitive physical actions prevail, ④which tends to interfere with the performance of non-repetitive actions which need thinking about. For example, there is evidence suggesting that music increases the number of errors in typing.

1. [고2 응용어법]

다음 글의 흐름상 밑줄 친 곳에 <u>문맥상 혹은 어법상 어색한 부분</u>이 있는 것을 골라 수정하시오.

[고2]

(A) An interesting question related to processing fluency in organizations concerns how organizations gauge their employees' and customers' opinions. Consider the following example. A manager consistently gets requests from one employee ①<u>that a company policy is changed.</u> From those requests, the manager must decide how the other people in the organization feel about the issue in question. Will the vocal employee's frequent requests bias the manager's sense of how the rest of the people in the organization feel about the policy? Research by Weaver, Garcia, Schwartz, and Miller suggests the answer is yes. In a series of six experiments, they demonstrated that people have a tendency to infer that a familiar opinion is a prevalent one, ②<u>even if the perceiving familiarity is the result</u> of one particularly vocal group member.

(B) Have humans developed food preferences? Both humans and rats have developed taste preferences for sweet foods, which provide rich sources of calories. A study of food preferences among the Hadza hunter-gatherers of Tanzania found that honey was the most highly preferred food item, an item that has the highest caloric value. Human newborn infants also show a strong preference for sweet liquids. Both humans and rats dislike bitter and sour foods, which tend to contain toxins. They also adaptively adjust their eating behavior in response to deficits in water, calories, and salt. Experiments show that rats display an immediate liking for salt the first time they experience a salt deficiency. They likewise increase their intake of sweets and water when their energy and fluids become depleted. ③<u>These appear to be specific evolved mechanisms</u>, designed to deal with the adaptive problem of food selection, and coordinate consumption patterns with physical needs.

(C) Many birds winter in warmer climates - many of which happen to be coffee-producing countries - nesting in plantation trees planted to shade the coffee from too much direct sunlight. These same trees offer birds seasonal habitat. So bird-friendly coffee benefits coffee flavor and birds. It also means certification that a farm uses no synthetic chemicals. The cost of this certification is yield - a bird-friendly farm yields approximately one-third less per year. Lack of such a label, however, does not automatically mean the coffee is ④<u>unfriendly to birds or poorer quality</u>. There are other ways to shade coffee trees besides trees. Mountainsides offer similar shade benefits, and some geographic regions feature natural cloud cover. So although being bird-friendly is generally favorable, it's not a conclusive quality indicator.

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최 장 빈 T

1. [고2-고1 응용어법]

다음 글의 흐름상 밑줄 친 곳에 <u>문맥상 혹은 어법상 어색한 부분</u>이 있는 것을 골라 수정하시오.

[고2]

(A) Most prodigies don't make a transition from a child who learns rapidly and effortlessly in an established domain to an adult who ultimately remakes a domain. They apply their extraordinary abilities in ordinary ways, mastering their jobs without questioning defaults and without making waves. In every domain they enter, they play it safe by following the conventional paths to success. They become doctors who heal their patients without fighting to fix the broken systems that prevent many patients from affording health care in the first place. They become lawyers who defend clients for violating outdated laws without trying to transform the laws themselves. They become teachers who plan engaging algebra lessons without questioning ①<u>whether algebra to be what their students need to learn</u>. Although we rely on them to keep the world running smoothly, they keep us running on a treadmill.

(B) Surely ②<u>nothing would count as having</u> human-level intelligence unless it had language, and the chief use of human language is to talk about the world. In this sense, intelligence is bound up with what philosophers call intentionality. Moreover, language is a social phenomenon, and a primary use of language within a group of people is to talk about the things they can all perceive such as this tool or that piece of wood, or have perceived yesterday's piece of wood, or might perceive tomorrow's piece of wood, maybe. In short, language is grounded in awareness of the world. In an embodied creature or a robot, such an awareness would be evident from its interactions with the environment – avoiding obstacles, picking things up, and so on. But we might widen the conception to include a distributed, disembodied artificial intelligence equipped with suitable sensors.

[고1]

Reminding is very useful for planning and for understanding the plans of others. When someone tells you a story, however, he is talking not only about plans, but often about beliefs. When what is to be understood in a story is about beliefs, the kind of guidance we need changes. We do not need to know what will happen next. When we hear these kinds of stories, ③<u>all we are trying to do is understanding them</u>. If we are passively viewing a movie, for example, understanding the movie means being able to follow what is going on by relating ④<u>what we are seeing what we know</u>, learning something from the movie in a very weak sense of learning. In a conversation, understanding means being able to respond to a story. In both of these cases, then, understanding means attempting to extract indexes such that old stories can be related to new ones. For movies, the intent is recognition. For conversation, the intent is to be able to respond.