

# 2020학년도 송실대학교 편입학 시험 문제



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# 영 어, 수 학 (B형)

지망학과(부) :

수험번호 :

성명 :

문항배점 : [1-10] 1점 / [11-20] 2.5점 / [21-25] 3점 / [26-31] 1.7점 / [32-44] 2점 / [45-50] 2.3점

**[1-2] Choose the one that is grammatically NOT correct. (각 1점)**

[1] Doctors ① have always seen depression as something that's distinct from ordinary sadness, but what causes it and how best ② to treat it has changed wildly over the years. In the 5<sup>th</sup> century B.C., Hippocrates ③ believed that the body was made up of four humors and that too much "black bile," the humor secreted by the spleen, ④ resulting in melancholia.

[2] As an example of AI ① pushing the human boundaries of creativity and ② helping us to discover new things, Du Sautoy cites the Continuator, a musical instrument ③ training to respond to users. In 2012, French jazz musician Bernard Lubat improvised with the Continuator, which was trained in his style of musicianship, ④ leaving audiences unable to distinguish the difference between the machine and the musician.

**[3-6] Choose the expression that is closest in meaning to the underlined part. (각 1점)**

[3] Huawei has long been accused of leaving secret vulnerabilities or "back doors" in its software and hardware that would permit illicit access to private data.

- ① illegal      ② imminent      ③ irresponsible      ④ immediate

[4] "So long as we continue to pigeonhole people into certain diets without considering the individuals, the more likely we are to run into problems."

- ① diagnose      ② persuade      ③ stimulate      ④ categorize

[5] There may be no more flagrant example of the achievers' triumph than how they were able to avoid accountability when the banks they ran crashed the economy.

- ① responsibility      ② bankruptcy      ③ allegation      ④ compatibility

[6] Obar's fears about being the first pregnant woman to use her own stem cells in a study to treat her baby's alpha thalassemia in utero were quickly assuaged when she watched the blood transfusions take place smoothly.

- ① dismissed      ② accelerated      ③ relieved      ④ surfaced

**[7-10] Choose the most appropriate word for the blank. (각 1점)**

[7] \_\_\_\_\_, literally "worthy" in Latin, matters because it's an idea that we've returned to again and again over the centuries as a way of understanding how humans can live together decently, respectfully.

- ① Dignity      ② Frugality      ③ Ingenuity      ④ Longevity

[8] People with low levels of physical activity are at higher risk for many different kinds of cancer, heart disease, Alzheimer's disease and early death by any cause. That's at the end of life. Long before that, \_\_\_\_\_ can worsen arthritis symptoms, increase lower-back pain and lead to depression and anxiety.

- ① greed      ② inactivity      ③ impatience      ④ stress

[9] World production has increased \_\_\_\_\_. From 2.3 million tons in 1950, it grew to 162 million in 1993 and to 448 million by 2015. But the amount of plastic drifting on the ocean and washing up on beaches, alarming as it was, didn't seem to be rising as fast.

- ① stubbornly      ② trivially      ③ sluggishly      ④ exponentially

[10] Nearly every night of our lives, we undergo a startling \_\_\_\_\_. Our brain profoundly alters its behavior and purpose, dimming our consciousness. For a while, we become almost entirely paralyzed.

- ① metabolism      ② metamorphosis      ③ metaphysics      ④ metaphor

**[11-13] Read the following passage and answer the questions. (각 2.5점)**

Artificial intelligence can help doctors do a better job of finding breast cancer on mammograms, researchers from Google and medical centers in the United States and Britain are reporting in the journal *Nature*.

The new system for reading mammograms, which are X-rays of the breast, is still being studied and is not yet available for widespread use. It is just one of Google's ventures into medicine. Computers can be trained to recognize patterns and interpret images, and the company has already created algorithms to help ( A ) lung cancers on CT scans, diagnose eye disease in people with diabetes and find cancer on microscope slides.

"This paper will help move things along quite a bit," said Dr. Constance Lehman, director of breast imaging at the Massachusetts General Hospital in Boston, who was not involved in the study. "There are challenges to their methods. But having Google at this level is a very good thing."

Tested on images where the diagnosis was already known, the new system performed better than radiologists. On scans from the United States, the system produced a 9.4 percent reduction in false negatives, in which a mammogram is mistakenly read as normal and a cancer is missed. It also provided a lowering of 5.7 percent in false positives, where the scan is incorrectly judged abnormal but there is no cancer. On mammograms performed in Britain, the system also beat the radiologists, reducing false negatives by 2.7 percent and false positives by 1.2 percent.

Google paid for the study, and worked with researchers from Northwestern University in Chicago and two British medical centers, Cancer Research Imperial Centre and Royal Surrey County Hospital.

[11] Which of the following best fits in (A).

- ① worsen      ② avoid      ③ detect      ④ deceive

[12] Which of the following is true?

- ① The new system for reading X-rays of the breast is not yet available for general use.  
② The development of an AI system reading mammograms is Google's first and only venture into medicine.  
③ Dr. Lehman has a negative opinion on the paper's contribution to medical science.  
④ Google did research with the financial supports from Northwestern University and two British medical centers.

[13] Which of the following is NOT true about the result of test on images where the diagnosis was already known?

- ① The system was not perfect in reading mammograms.  
② In a test in Britain, the rate of the system's false negatives was 2.7 percent.  
③ The system's reduction rates were greater in false negatives than in false positives.  
④ The human radiologists performed worse than the system.

**[14-15] Read the following passage and answer the questions. (각 2.5점)**  
 If such a thing as American exceptionalism remains, maybe it can be found in this: Despite deep Internal Revenue Service (IRS) budget cuts, an average audit rate that has plunged in recent years to just 0.6 percent, and a president who has bragged that dodging federal taxes is “smart,” most Americans still pay their income taxes every year. Even more remarkable, most of us feel ( A ) to pay. To quote the findings of a 2017 IRS survey: “The majority of Americans (88%) say it is not at all acceptable to cheat on taxes; this ethical attitude is not changing over time.”

True, tax crooks might not confess their real feelings in an IRS survey. But other data confirm that the U.S. is among the world’s leaders when it comes to what economists call the voluntary compliance rate (VCR). In recent decades, America’s VCR has consistently hovered between 81 and 84 percent. Most countries don’t calculate their VCR regularly, but when they do, they lag behind the U.S. One paper that gathered what comparative data were available reported that Germany, the top European Union economy, had a VCR of 68 percent.

Other countries score worse, among them Italy (62 percent), the site of a sprawling tax scandal in which about 1,000 citizens were charged last year with bilking the government out of 2.3 billion euros in tax revenue. The public didn’t seem terribly bothered. Ex-Prime Minister Silvio Berlusconi, who was convicted of tax fraud in 2013, may have tapped a common sentiment when he said back then that “evasion of high taxes is a God-given right.”

[14] Which of the following best fits in (A)?

- ① excited      ② obliged      ③ displeased      ④ resentful

[15] Which of the following is true?

- ① Americans tend to be dishonest in paying taxes.  
 ② The IRS survey on American taxpayers directly conflicts with other data.  
 ③ Germany’s VCR is below 50 percent.  
 ④ Italians seem more tolerant of tax cheating than Americans.

**[16-17] Read the following passage and answer the questions. (각 2.5점)**

The Chinese scientist who created the world’s first gene edited babies has been jailed for three years for his illegal experiments, state officials have announced. He Jiankui was also ( A ) three million yuan (\$430,000) for his work, which he announced at the International Human Genome Editing Summit in Hong Kong in November, 2018. At the summit, He told attendees how he had modified embryos so they would be more resistant to HIV. His work led to the birth of twin girls, named Lulu and Nana.

His announcement was met with worldwide condemnation and shortly after he was fired from his position at the Southern University of Science and Technology in Shenzhen. He was then apparently placed under some form of house arrest while authorities in China investigated his work.

Xinhua said He’s actions had violated scientific and ethical integrity and that the people involved in the research would be “dealt with seriously according to the law.”

The news agency has now announced that He, along with Zhang Renli and Qin Jinzhou, from medical institutions in Guangdong Province, had been jailed. He was given a three year sentence, while Zhang and Qin were given terms of two years and 18 months respectively.

The court, in Shenzhen city, said all three had knowingly broken the laws around gene editing. The verdict said the three had acted “in the pursuit of personal fame and gain.”

When He made his announcement, few details of what he did were made available. Earlier this month, manuscripts of his research were published by *MIT Technology Review*, with experts calling the work “delusional and outrageous.” Fyodor Urnov, genome-editing scientist at the University of California, Berkeley, told MIT that the manuscripts show how no effort was made to carry out laboratory

experiments to show the gene editing worked before implanting the embryos in a woman. “This proves that the research team placed their interests above those of the couple who donated the embryos and of their prospective children.”

[16] Which of the following best fits in (A).

- ① rejected      ② forbidden      ③ fined      ④ awarded

[17] Which of the following is NOT true?

- ① He Jiankui was sentenced to three year imprisonment by the court.  
 ② Among those involved in the human embryo modification, He Jiankui was not the only jailed person.  
 ③ Fyodor Urnov praised He Jiankui for his outstanding scientific achievements.  
 ④ He was confined in his house during the Chinese government’s investigation of the case.

**[18-20] Read the following passage and answer the questions. (각 2.5점)**

Rafael Nadal, one of the world’s top tennis players, now has twelve French Open championships. A bit of perspective: until Roger Federer, Novak Djokovic, and Nadal came along, Pete Sampras led the list of Grand Slam championship winners, with an all-time total of fourteen. On Sunday afternoon, with the wind and rain that had marred play at Roland-Garros for days yielding to comfortable Paris-in-springtime weather, Nadal defeated Dominic Thiem 6-3, 5-7, 6-1, 6-1. A bit more perspective: it was not as lopsided as the scoring line suggests. The first hour or so was as good—with lengthy rallies, harefooted scrambles, keen variations of pace and placement—as clay-court tennis gets. In the hour that followed, Thiem managed to take a set from Nadal, something he’d never before done at Roland-Garros, despite being, arguably, the second-best men’s clay-surface player at the moment. Even in the final two sets, Thiem reached balls and struck shots that should have earned him points, but didn’t—not against Nadal. Which is to say that Thiem played championship-level tennis, but not Nadal-on-Chatrier-level tennis.

There are particular aspects of Thiem’s game that make it difficult for him to beat Nadal, though he had beaten him four times on clay, and lost eight times, before this match. Thiem requires time to set up his groundstrokes—he takes his racquet way back, especially when getting ready to deliver his one-handed drive backhand. He has to get his adjustment steps just right and his feet firmly planted. This buys Nadal that extra second to reestablish court position after he’s been yanked to the corner by, say, a deep, sharply angled shot. A player like Djokovic can deny Nadal that time by taking the ball early, on the rise, or by hitting big balance-defying down-the-line shots at full stretch. But that’s not Thiem. And Thiem, like Federer in years past, struggles with Nadal’s serve to his backhand, especially in the ad court. The lefty’s slice skids out wide on him; more than once on Sunday, Thiem’s feet got tangled in pursuit of it. And Nadal kept showing him that serve, unceasingly as the match ( A ).

[18] Which of the following best fits in (A)?

- ① wore on      ② was called off      ③ came to a halt      ④ was put off

[19] What is the tone of the passage?

- ① sarcastic      ② emphatic      ③ ironic      ④ analytic

[20] Which of the following is NOT true?

- ① Nadal won French Open championship twelve times.  
 ② Nadal beat Thiem easily from the beginning.  
 ③ Thiem’s play was excellent but not enough to beat Nadal on clay court.  
 ④ Thiem’s long set-up time for groundstrokes afforded Nadal time to strike back effectively.

[21-23] Read the following passage and answer the questions. (각 3점)

Fauvism was the first avant-garde art movement of the 20<sup>th</sup> century. Spearheaded by a trio of young, Paris-based painters—Henri Matisse, André Derain and Maurice de Vlaminck—it was characterized by intense, expressive, non-naturalistic color, along with loose brushwork and simplified forms. Active from around 1905 to 1910, the Fauvists drew on—and advanced—several, recent currents of art: chiefly that of the Impressionists, Pointillists, Gauguin and Van Gogh, who refused to use colors in a way that literally corresponded to the subjects they were describing. As Matisse put it, “when I put down a green, it doesn’t mean grass; and when I put down a blue, it doesn’t mean the sky.” Color, in short, was completely set free.

The movement’s name derives from the French word for wild beast—fauve—and was coined by the stunned art critic, Louis Vauxcelles, when writing a review of the Autumn Salon exhibition in Paris in 1905. Seeing a Quattrocento-style sculpture displayed in the same room as eye-popping paintings by Matisse, Derain, and so on, he said, was like witnessing “Donatello chez les fauves” (Donatello among wild beasts). The label stuck, and Fauvism was born.

Fauvism was only made possible by advances in industrial manufacturing in the 19<sup>th</sup> century, which created new and brighter-colored paint pigments. The group often used these straight from the tube, without mixing—which is to say, in the strongest possible form—in defiance of Academy practice and, indeed, of Western artistic convention generally.

Even though the Fauvists made revolutionary art, it’s fair to say they didn’t have the personalities of “( A ).” Before becoming a painter, Matisse was a lawyer, for example, while Derain was an engineer.

Given the brilliant colors and spontaneous brushwork, the movement on which Fauvism had the greatest impact was probably German Expressionism. However, by subordinating everything—including the realistic depiction of subjects—to the interplay of colors, the Fauves also opened the way to abstraction.

[21] Which of the following best fits in (A)?  
① rationality    ② wild beast    ③ good humor    ④ obedience

[22] Which of the following is NOT a characteristic of Fauvism?  
① carefully designed brushwork  
② rejection of artistic convention  
③ revolutionary artistic style  
④ use of intense and expressive color

[23] Which of the following is true?  
① Fauvism was not related to the advances of paint pigment.  
② For Fauvism, color was more important than the realistic drawing of subjects.  
③ Gauguin refused to accept Fauvist techniques.  
④ Matisse coined the term “Fauvism.”

[24-25] Read the following passage and answer the questions. (각 3점)

Technical flaws can result in surprising and charming effects that you can only dream of achieving with Instagram filters. For example, some of our favorite analog photos are tinted green or purple from film used past its expiration date. In fact, many photographers actually seek out expired film to experience the excitement of not knowing what the shot will end up looking like.

Sometimes a film photograph looks like it has a fabric overlay, a gritty surface, or even a dreamy smoothness. The depth of this texture is a delicate feature that is often overlooked. However, once you start paying attention it simply becomes a key factor in appreciating the true beauty of a photo.

Film photography aims to grab all the color in your shot and hand paint it. The amazing variety of film choices available allows

you to choose the best characteristics for each shooting—whether it’s cooler or warmer tones, more or less light, or natural or vibrant colors.

Monochromatic film is a classic. The deep blacks, contrast and dark shadows are any photographer’s dream. Some shots are just meant to be taken in black and white, and film manages to capture this in the moodiest of ways.

The feeling of holding an old film camera and carrying around rolls of film brings us back to a different era and reminds us of cherished memories. This heartwarming feeling is believed to be one of the main reasons behind the growing trend of photographers going back to film over the last few years. Yet it’s about so much more than just reminiscing about past experiences. Film also makes us miss a time when the world moved slower.

[24] Which of the following is best for the title?  
① Analog vs Digital: Which One Is More Powerful  
② How to Revive Your Memories  
③ An Art of Freezing Time  
④ Timeless Beauty: Why We Love Film Photography So Much

[25] Which of the following best summarizes the first paragraph?  
① the flawless rendering of the analog world  
② the vibrant character of creativity  
③ the unexpected imperfections  
④ the use of recycled film

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[26]  $2x^3 + 2y^3 = 9xy$  의 그래프 위의 점  $(1, 2)$  에서의 법선의 방정식을 구하면? (1.7점)

- ①  $4x - 5y + 6 = 0$ 
 ②  $5x + 4y - 13 = 0$
- ③  $4x + 5y - 14 = 0$ 
 ④  $5x - 4y + 3 = 0$

[27] 다음 중 곡면  $z = x^2 + xy + y^3$  위의 점  $(1, -1, -1)$  에서의 접평면의 법선벡터는? (1.7점)

- ①  $< 0, 0, 1 >$ 
 ②  $< -1, -4, 1 >$
- ③  $< 2, 1, 3 >$ 
 ④  $< -2, 1, 2 >$

[28] 극한값  $\lim_{x \rightarrow 0} (1 + \tan 2x)^{\frac{1}{2x^2 + x}}$  은? (1.7점)

- ①  $\frac{1}{2}$ 
 ②  $1$ 
 ③  $e$ 
 ④  $e^2$

[29] 다음 중 수렴하는 급수는? (1.7점)

- ①  $\sum_{n=1}^{\infty} \left( \frac{1}{n} + \frac{1}{n+1} \right)$ 
 ②  $\sum_{n=1}^{\infty} \left( \frac{1}{n} - \frac{1}{n+1} \right)$
- ③  $\sum_{n=1}^{\infty} \left( \frac{1}{n^2} + \frac{1}{n+1} \right)$ 
 ④  $\sum_{n=1}^{\infty} \left( \frac{1}{n^2} - \frac{1}{n+1} \right)$

[30] 다음 이상적분 중 수렴하는 것을 모두 고르면? (1.7점)

(가) $\int_1^{\infty} e^{-x^2} dx$	(나) $\int_0^{\infty} \frac{1+e^{-x}}{x} dx$
(다) $\int_0^1 \frac{1}{x-1} dx$	(라) $\int_{-\infty}^{\infty} \frac{1}{1+x^2} dx$

- ① (가), (나)
 ② (나), (다)
 ③ (다), (라)
 ④ (가), (라)

[31] 다음 중  $\mathbb{R}^3$  에서  $T_A \begin{bmatrix} x \\ y \\ z \end{bmatrix} = A \begin{bmatrix} x \\ y \\ z \end{bmatrix}$  로 정의되는 선형사상이 일대일 함수가 아닌 행렬  $A$  는? (1.7점)

- ①  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$ 
 ②  $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix}$
- ③  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{bmatrix}$ 
 ④  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & -1 & -1 \end{bmatrix}$

[32]  $x = 2t, y = t^2 - 3$  일 때,  $\frac{d^2y}{dx^2}$  의 값은? (2.0점)

- ①  $-\frac{1}{2}$ 
 ②  $-1$ 
 ③  $\frac{1}{2}$ 
 ④  $1$

[33] 곡선  $y = \tanh^{-1}(2x)$  의  $x = 0$  에서의 접선의 방정식을 구하면? (2.0점)

- ①  $y = -2x$ 
 ②  $y = \frac{1}{2}x$ 
 ③  $y = x$ 
 ④  $y = 2x$

[34]  $x = 1$  에서  $f(x) = \cot^{-1}x$  의 접선에 대한 선형근사식을 이용하여  $f(1.1)$  의 근삿값을 구하면? (2.0점)

- ①  $\frac{\pi}{4} - 0.05$ 
 ②  $\frac{\pi}{4} + 0.05$ 
 ③  $\frac{\pi}{2} - 0.05$ 
 ④  $\frac{\pi}{2} + 0.05$

[35]  $f(x) = 2x + \cos x$  일 때 적분  $\int_1^{2\pi-1} f^{-1}(x) dx$  의 값은? (2.0점)

- ①  $\pi^2 - \pi$ 
 ②  $\pi^2 - 1$ 
 ③  $2\pi + 1$ 
 ④  $\frac{\pi^2}{2} + 1$

[36] 적분  $\int_0^4 e^{\sqrt{x}} dx$  의 값은? (2.0점)

- ①  $2(e^2 + 1)$ 
 ②  $e^2 + 1$ 
 ③  $e^2$ 
 ④  $e^2 - 1$

[37]  $x = 1$  과  $x = 4$  사이의 곡선  $y = \int_1^x \sqrt{t^3 - 1} dt$  의 길이는? (2.0점)

- ①  $\frac{62}{5}$ 
 ②  $\frac{14}{3}$ 
 ③  $\frac{\pi}{6}$ 
 ④  $\frac{2\sqrt{2}}{5}\pi$

[38] 곡면  $x^2 + y^2 + z^2 = 6$  과  $x + 2y^2 + 3z^3 = 1$  위의 점  $(2, 1, -1)$  에서 두 곡면에 모두 접하는 직선의 방향벡터는? (2.0점)

- ①  $< 13, -19, 7 >$ 
 ②  $< 5, -20, 9 >$
- ③  $< 11, -5, -4 >$ 
 ④  $< 9, 0, -2 >$

[39] 함수  $f(t)$  와  $F(x)$  가 다음과 같을 때,  $F(x)$  에 대한 설명 중 옳지 않은 것은? (2.0점)

$$f(t)=\begin{cases} 2t, & 0 \leq t < 1 \\ 2-t, & 1 \leq t \leq 3 \end{cases} \quad , \quad F(x)=\int_0^x f(t)dt$$

- ① 구간  $[0, 3]$  에서 연속이다.  
 ②  $x = 1$  에서 미분 불가능하다.  
 ③ 구간  $[1, 3]$  에서 감소한다.  
 ④  $x = 2$  에서 최댓값을 갖는다.

[40] 행렬  $M=\begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 4 & 3 & 2 \end{bmatrix}$  의 고윳값을  $\lambda_1, \lambda_2, \lambda_3$  라고 할 때,  $\lambda_1\lambda_2\lambda_3 + \lambda_1\lambda_2 + \lambda_2\lambda_3 + \lambda_1\lambda_3 + \lambda_1 + \lambda_2 + \lambda_3$  의 값은? (2.0점)

- ① 1                      ② 3                      ③ 4                      ④ 9

[41]  $2 \times 2$  행렬  $A$ 에 대하여  $A^2=I$  일 때, 다음 중 옳은 것을 모두 고른 것은? (2.0점)

(가)  $A$ 는 가역행렬이다.  
 (나)  $\det A = -1$  이면  $\operatorname{tr} A = 0$  이다.  
 (다)  $\det A = 1$  이면  $A$ 는 대각행렬이다.

- ① (가), (나)                      ② (가), (다)  
 ③ (나), (다)                      ④ (가), (나), (다)

[42] 다음 중 수렴반경이 제일 큰 멱급수는? (2.0점)

- ①  $\sum_{n=0}^{\infty} 2^n x^n$                       ②  $\sum_{n=0}^{\infty} n! x^n$   
 ③  $\sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^n x^n$                       ④  $\sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^{n^2} x^n$

[43] 초깃값 문제  $y' = y - x$  ,  $y(0) = \frac{2}{3}$  의 해를  $y(x)$  라고 할 때  $y(x)$  가 최댓값을 갖는  $x$ 의 값을 구하면? (2.0점)

- ①  $\ln 2$                       ②  $\ln 3$                       ③  $2 \ln 3$                       ④  $2 \ln 5$

[44]  $y(t)$  가 초깃값 문제  $y'' - y' - 2y = 0$  ,  $y(0) = 2$  ,  $y'(0) = 1$  의 해일 때  $y(\ln 3)$  의 값은? (2.0점)

- ①  $-\frac{28}{3}$                       ②  $-\frac{3}{28}$                       ③  $\frac{3}{28}$                       ④  $\frac{28}{3}$

[45] 반지름이  $10cm$  인 구에 내접하면서, 높이가 매초  $1cm$  씩 줄어드는 직원뿔이 있다. 최초  $12cm$  였던 이 직원뿔의 높이가  $9cm$ 가 될 때, 직원뿔의 부피의 순간변화율은 몇  $cm^3/sec$  인가? (2.3점)

- ①  $-42\pi$                       ②  $-39\pi$                       ③  $-36\pi$                       ④  $-20\pi$

[46] 함수  $f(x) = \ln x + \frac{2}{x} + \frac{a}{x^2}$  에 대한 설명 중 옳은 것을 모두 고르면? (2.3점)

(가)  $-\frac{1}{2} < a < 0$  일 때  $f(x)$  는 극댓값과 극솟값을 모두 갖는다.  
 (나)  $a < -\frac{1}{2}$  일 때  $f(x)$  는 극솟값을 갖는다.  
 (다)  $a > 0$  일 때  $f(x)$  는 극댓값을 갖는다.

- ① (가)                                      ② (가), (다)  
 ③ (나), (다)                              ④ (가), (나), (다)

[47] 삼중적분  $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{x^2+y^2}} (x^2+y^2) \, dz \, dy \, dx$  의 값은? (2.3점)

- ①  $\frac{\pi}{20}$                       ②  $\frac{\pi}{10}$                       ③  $\frac{\pi}{5}$                       ④  $\frac{\pi}{4}$

[48] 이중적분  $\int_0^4 \int_{\sqrt{x}}^2 \frac{1}{1+y^3} \, dy \, dx$  의 값은? (2.3점)

- ①  $2\sqrt{2}$                       ②  $2\sqrt{3}$                       ③  $\frac{\ln 3}{3}$                       ④  $\frac{2 \ln 3}{3}$

[49] 초깃값  $\begin{pmatrix} y_1(0) \\ y_2(0) \end{pmatrix} = \begin{pmatrix} 3 \\ A \end{pmatrix}$  를 만족하는 연립 미분방정식

$$\begin{bmatrix} y_1' \\ y_2' \end{bmatrix} = \begin{bmatrix} -1 & 1 \\ 4 & -1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \end{bmatrix}$$

의 해  $y_1(t), y_2(t)$  에 대하여  $\lim_{t \rightarrow \infty} y_1(t) = \lim_{t \rightarrow \infty} y_2(t) = 0$  이 성립하는  $A$ 의 값은? (2.3점)

- ①  $-6$                       ②  $-3$                       ③  $3$                       ④  $6$

[50]  $f(x) = \frac{2}{(2-x)^2}$  의 맥클로린 급수가  $\sum_{n=0}^{\infty} a_n x^n$  이고  $xf^{(3)}(x)$

의 맥클로린 급수가  $\sum_{n=1}^{\infty} b_n x^n$  일 때,  $\lim_{n \rightarrow \infty} \frac{n^3 a_n}{b_n}$  의 값은? (2.3점)

- ① 1                      ② 2                      ③ 4                      ④ 8