

# 2021학년도 송실대학교 편입학 시험 문제



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2021학년도 송실대학교 편입학 시험 문제 (자연계)

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지망학과(부) :

수험번호 :

성명 :

문항배점 : [1-10] 1점 / [11-20] 2.5점 / [21-25] 3점 / [26-32] 1.7점 / [33-43] 2점 / [44-50] 2.3점

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

[1] Yesterday was probably our ① all-time heaviest day of margin calls. But, ② giving the condition of the market, it was not unexpected. When the market makes ③ that steep, downward move and there are a lot of stocks affected, you're going to see margin calls. It's almost like a physical law of gravity. Heavy margin debt ④ was said to be a big factor in the 1929 stock market crash.

[2]

① Having said that, I disagree that women and men are essentially the same.  
② Having done these things, she hid them until she was arrested and put in prison.  
③ Having told that the acoustics were the best behind the balcony, I decided to head there when the doors opened.  
④ Having covered scores of trials, I am well acquainted with courtroom etiquette.

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

[3] An economic model's power stems from the elimination of irrelevant details, which allows the economist to focus on the essential features of the economic reality he or she is attempting to understand.  
① complex      ② confusing      ③ specific      ④ trivial

[4] An unexpected twist in the plot at the end of a story is called a surprise ending. The surprise may be sudden turn in the action or a revelation that gives a new perspective to the entire story.  
① disclosure      ② lesson      ③ plot      ④ prophecy

[5] At its best, the Internet is good in very much the ways that phone calls and correspondence can be good, as these channels sometimes actually make it easier to be honest about hard things. Some things are easier to say when you can pause to compose yourself, research a point, and so on.  
① become calm      ② criticize yourself  
③ take a stance      ④ write music

[6] Many small businesses that may have had little digital presence are upping their online offerings.  
① abandoning      ② increasing      ③ preparing      ④ vacating

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

[7] He was born deaf and underwent a surgery at age 5 that gave him some hearing, but he still speaks with a \_\_\_\_\_. In elementary school, he got bullied so much that he barely spoke.  
① confidence      ② crutch      ③ microphone      ④ stutter

[8] \_\_\_\_\_ it is true that some people are gifted with traits or skills that are generally associated with entrepreneurs, it appears increasingly clear that these entrepreneurial skills and competencies can be developed, in particular through education.  
① Although      ② Because      ③ If      ④ Once

[9] In Copenhagen, Denmark, in 1943, 10-year-old Annemarie Johansen and her best friend Ellen Rosen have their lives disrupted forever by the Nazi \_\_\_\_\_ of Jews.  
① collaboration      ② persecution  
③ rehabilitation      ④ secularization

[10] For decades, the words of those telling the truth have been \_\_\_\_\_. Because the victor writes history, the history of the West has been written to minimize the realities experienced by people of color, even to those who experience them first-hand.

① strongly encouraged      ② widely publicized  
③ left unheeded      ④ well documented

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

Hummingbirds are, for the most part, unsociable. In fact, the adjectives pugnacious and feisty are often appropriate. When more than one hummingbird is around, it is often a scene of repeated high-speed chases. In fact, male and female hummingbirds do not form a pair-bond after mating, and the female is left to care for eggs and chicks alone.

Hummingbirds do not need the help of other hummingbirds to locate food or fend off predators. Other hummingbirds are competitors for the flower nectar upon which they thrive. The help that a male might provide a female does not outweigh the burden of having a male around competing for food.

What is all this fighting about? Plants take time to secrete nectar into their flowers. In an ideal world, hummingbirds should ( A ) their visits to flowers to take advantage of a full load of nectar. But they wait to feed at a flower at the risk of other hummingbirds beating them to the punch. It is therefore worth the effort for hummingbirds to chase away competitors, so they have access and control of their favorite flowers.

In many cases, hummingbirds defend small territories around a favorite flower patch, and do so even during brief stopovers for refueling during migration. Where many species live together, the large species attempt to dominate flowers to get the biggest drinks of nectar, and smaller species try to sneak in for a few sips.

About the closest hummingbirds come to being social is in the tropics. The males of a small number of species form leks, places where they gather for months at a time and sing their scratchy hummingbird songs in an effort to attract females. The females are attracted to the leks, and the males then compete for the opportunity to mate.

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

① notify      ② record      ③ respect      ④ time

[12] Which of the following is best for the title?

① Brave Band of Brothers  
② Art of Beating in the Woods  
③ What a Competitive Bird!  
④ Beautiful Singers in the Leks

[13] Which of the following is true about hummingbirds?

① Males and females stay together after mating.  
② Males are dedicated to help females with food gathering.  
③ The nectar intake varies with the size of the species.  
④ Males and females cooperate to form leks for mating.

[14-15] Read the following passage and answer the questions. (각 2.5점)

An earthquake is what happens when two blocks of the earth suddenly slip past one another. The surface where they slip is called the fault or fault plane. The location below the earth's surface where the earthquake starts is called the hypocenter, and the location directly above it on the surface of the earth is called the epicenter.

Sometimes an earthquake has foreshocks. These are smaller earthquakes that happen in the same place as the larger earthquake that follows. Scientists cannot tell that an earthquake is a foreshock until the larger earthquake happens. The largest, main earthquake is called the mainshock. Mainshocks always have aftershocks that follow. These are smaller earthquakes that occur afterwards in the same place as the mainshock. Depending on the size of the mainshock, aftershocks can continue for weeks, months, and even years after the mainshock!

Then, what causes earthquakes and where do they happen? The earth has four major layers: the inner core, outer core, mantle and crust. The crust and the top of the mantle make up a thin skin on the surface of our planet. But this skin is not all in one piece. It is made up of many pieces like a puzzle covering the surface of the earth. Not only that, but these puzzle pieces keep slowly moving around, sliding past one another and bumping into each other. We call these puzzle pieces tectonic plates, and the edges of the plates are called the plate boundaries. The plate boundaries are made up of many faults, and most of the earthquakes around the world occur on these faults. Since the edges of the plates are rough, they get stuck while the rest of the plate keeps moving. Finally, when the plate has moved far enough, the edges unstick on one of the faults and there is an earthquake.

[14] Which of the following is true?

- ① Most earthquakes occur on the faults of the plate boundaries.
- ② The epicenter of an earthquake is located directly beneath the starting point.
- ③ Mainshocks precede foreshocks but sometimes are not followed by aftershocks.
- ④ An earthquake happens because the earth has multiple layers in one piece.

[15] Which of the following determines the duration of an earthquake?

- ① the time of its breakout
- ② the size of its mainshock
- ③ the number of its foreshocks
- ④ the size of the faults

[16-18] Read the following passage and answer the questions. (각 2.5점)

Burnout is a state of emotional, physical, and mental exhaustion caused by excessive and prolonged stress. It occurs when you feel overwhelmed, emotionally drained, and unable to meet constant demands. As the stress continues, you begin to lose the interest and motivation that led you to take on a certain role in the first place. Burnout reduces productivity and saps your energy, leaving you feeling increasingly helpless, hopeless, cynical, and resentful. Eventually, you may feel like you have nothing more to give.

The negative effects of burnout spill over into every area of life, including your home, work, and social life. Burnout can also cause long-term changes to your body that make you vulnerable to illnesses like colds and flu. Because of its many consequences, it's important to deal with burnout right away. Most of us have days when we feel helpless, overloaded, or unappreciated—when dragging ourselves out of bed requires the determination of Hercules. If you feel like this most of the time, however, you may be burned out.

Burnout is a gradual process. It does not happen overnight, but it can creep up on you. The signs and symptoms are subtle at first, but become worse as time goes on. Think of the early symptoms as red flags that something is wrong that needs to be addressed. If you pay attention and actively reduce your stress, you can prevent a

major breakdown. If you ignore them, you will eventually burn out.

Burnout may be the result of (A) unrelenting stress, but it is not the same as too much stress. Stress, by and large, involves too much: too many pressures that demand too much of you physically and mentally. However, stressed people can still imagine that if they can just get everything under control, they will feel better. Burnout, on the other hand, is about not enough. Being burned out means feeling empty and mentally exhausted, devoid of motivation, and beyond caring. People experiencing burnout often do not see any hope of positive change in their situations. If excessive stress feels like you are drowning in responsibilities, burnout is a sense of being all dried up. And while you are usually aware of being under a lot of stress, you don't always notice burnout when it happens.

[16] Which of the following best replaces (A)?

- ① undermined ② unmerciful ③ deficient ④ inconsistent

[17] Which of the following best describes burnout?

- ① It happens when you are emotionally relaxed.
- ② It cannot be ignored because it has clear symptoms.
- ③ It gradually affects your personal and social life.
- ④ It increases productivity and boosts your energy.

[18] Which of the following best explains the difference between burnout and stress?

- ① Unlike burnout, stress has a negative effect on health.
- ② Burnout brings about excessive stress, not vice versa.
- ③ Burnout causes more abrupt decline of health than stress.
- ④ Burnout is hard to notice whereas stress is not.

[19-20] Read the following passage and answer the questions. (각 2.5점)

Extreme sports, also known as action sports or alternative sports, refer to sporting events or pursuits characterized by high speeds and high risk. The sports most commonly placed in this group are skateboarding, snowboarding, freestyle skiing, in-line roller-skating, street lugeing, and BMX and mountain biking. Typically, extreme sports operate outside traditional mainstream sports and are celebrated for their adrenaline-pumping thrills. Racing and acrobatic competitions for motorcycles and snowmobiles are also often classified as "extreme," and the term can be stretched to include such daring pursuits as rock climbing and skydiving.

The primary extreme sports—skateboarding, in-line roller-skating, and BMX, for example—often make use of half-pipes (U-shaped structures) and urban landscapes for performing a wide range of tricks. The sports also share a unique subculture that separates them from traditional team sports. It is a youth-oriented culture that has embraced punk music and fashion and emphasizes individual creativity.

The term extreme sports is generally attributed to the X Games, a made-for-television sports festival created by the cable network ESPN in 1995. The success of the X Games raised the profile and economic viability of these sports. The extreme sports of mountain biking and snowboarding debuted at the Summer and Winter Olympic Games in 1996 and 1998, respectively.

Activities categorized by media as extreme sports differ from traditional sports due to the higher number of inherently uncontrollable variables. These environmental variables are frequently weather and terrain related, including wind, snow, water and mountains. Because these natural phenomena cannot be controlled, they inevitably affect the outcome of the given activity or event.

While traditional sporting judgment criteria may be adopted when assessing performance (distance, time, score, etc.), extreme sports performers are often evaluated on more subjective and aesthetic criteria. This results in a tendency to reject unified judging methods, with different sports employing their own ideals and indeed having the ability to evolve their assessment standards with new trends or developments in the sports.

[19] Which of the following best characterizes the nature of extreme sports?

- ① adaptability for the Olympic Games
- ② high speeds and high risk
- ③ economic viability
- ④ wide range of tricks

[20] Which of the following is true?

- ① Team spirits are crucial in extreme sports.
- ② Extreme sports wholly depend on urban landscapes for tricky performances.
- ③ Snowboarding was first introduced at the Winter Olympic Games in 1996.
- ④ Extreme Games are likely to change the rules when needs arise.

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

Gene therapy, also called human gene transfer, is a medical field which focuses on the utilization of the therapeutic delivery of nucleic acids into a patient's cells as a drug to treat disease. The first attempt at modifying human DNA was performed in 1980 by Martin Cline, but the first successful nuclear gene transfer in humans, approved by the US National Institutes of Health, was performed in May 1989. The first therapeutic use of gene transfer as well as the first direct insertion of human DNA into the nuclear genome was performed by French Anderson in a trial starting in September 1990. It is thought to be able to cure many genetic disorders or treat them over time.

Between 1989 and 2018, over 2,900 clinical trials were conducted, with more than half of them in phase I. As of 2017, Spark Therapeutics' Luxturna and Novartis' Kymriah are the FDA's first approved gene therapies to enter the market. Since that time, drugs such as Novartis' Zolgensma and Alnylam's Patisiran have also received FDA approval, in addition to other companies' gene therapy drugs.

The concept of gene therapy is (1) \_\_\_\_\_. If, for instance, in an (usually recessively) inherited disease, a mutation in a certain gene results in the production of a dysfunctional protein, gene therapy could be used to deliver a copy of this gene that does not contain the deleterious mutation, and thereby produces a functional protein. This strategy is referred to as gene replacement therapy and is employed to treat inherited retinal diseases.

While the concept of gene replacement therapy is mostly suitable for recessive diseases, novel strategies have been suggested that are capable of also treating conditions with a dominant pattern of inheritance.

The introduction of CRISPR gene editing has opened new doors for its application and utilization in gene therapy, as, instead of pure replacement of a gene, it enables correction of the particular genetic ( A ). Solutions to medical hurdles, such as the eradication of latent human immunodeficiency virus (HIV) reservoirs and correction of the mutation that causes sickle cell disease, may be available as a therapeutic option in the next couple of years.

[21] Which of the following best fits in (1)?

- ① to extract genetic information from patients
- ② to fix a genetic problem at its source
- ③ to generate mechanism to erase functional protein
- ④ to identify genetic patterns common to humans

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

- ① solution      ② diagnosis      ③ advantage      ④ defect

[23] Which of the following is NOT true?

- ① Martin Cline was the first scientist who attempted to modify human DNA.
- ② The first gene transfer for therapeutic purpose was conducted in 1990.
- ③ More than half of the clinical trials during 1989-2018 were performed in phase I.
- ④ Novartis' Zolgensma and Alnylam's Patisiran were approved by FDA before 2017.

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

Neurolinguistics is historically rooted in the development in the 19<sup>th</sup> century of aphasiology, the study of linguistic deficits (aphasia) occurring as a result of brain damage. Aphasiology attempts to correlate structure to function by analyzing the effect of brain injuries on language processing.

One of the first people to draw a connection between a particular brain area and language processing was Paul Broca, a French surgeon who conducted autopsies on numerous individuals who had speaking deficiencies, and found that most of them had brain damage (or lesions) on the left frontal lobe, in an area now known as Broca's area. Phrenologists had made the claim in the early 19<sup>th</sup> century that different brain regions carried out different functions and that language was mostly controlled by the frontal regions of the brain, but Broca's research was possibly the first (1) \_\_\_\_\_, and has been described as epoch-making and pivotal to the fields of neurolinguistics and cognitive science.

Later, Carl Wernicke, after whom Wernicke's area is named, proposed that different areas of the brain were specialized for different linguistic tasks, with Broca's area handling the motor production of speech, and Wernicke's area handling auditory speech comprehension. The work of Broca and Wernicke established the field of aphasiology and the idea that language can be studied through examining physical characteristics of the brain.

Early work in aphasiology also benefited from the early twentieth-century work of Korbinian Brodmann, who "mapped" the surface of the brain, dividing it up into numbered areas based on each area's cytoarchitecture (cell structure) and function. These areas, known as Brodmann areas, are still widely used in neuroscience today.

[24] Which of the following best fits in (1)?

- ① to offer empirical evidence for such a relationship
- ② to refute the claims of the early 19<sup>th</sup> century phrenologists
- ③ to recognize the role of Wernicke's work in neurolinguistics
- ④ to separate linguistic science from phrenology

[25] Which of the following is NOT true?

- ① Neurolinguistics exerted influence on the development of aphasiology.
- ② Broca's area is located on the left frontal lobe of the human brain.
- ③ Wernicke's area processes auditory speech comprehension.
- ④ Brodmann's work is currently utilized by many neuroscientists.

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공 백

[26] 정적분  $\int_0^1 \frac{x^4}{x^5-2} dx$  의 값은? (1.7점)

①  $5 \ln 3$       ②  $\frac{1}{5} \ln 3$       ③  $\frac{1}{5} \ln 2$       ④  $-\frac{1}{5} \ln 2$

[27] 극한  $\lim_{x \rightarrow 0} \frac{4x^2 - \sin^2(2x)}{x^4}$  의 값은? (1.7점)

①  $\frac{16}{3}$       ②  $\frac{4}{3}$       ③  $\frac{2}{3}$       ④  $2$

[28] 극한  $\lim_{h \rightarrow 0} \frac{\sin x (\cosh - 1) + (\cos x) (\sin h)}{h}$  의 값은? (1.7점)

①  $1$       ②  $\cos x$       ③  $\sin x$       ④  $0$

[29] 극한  $\lim_{x \rightarrow 0} \frac{4e^x + 3\ln x + x^2}{e^x + 2\ln x + 3x^2}$  의 값은? (1.7점)

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

[30] 크기가 같은 정사각행렬  $A, B$  가  $A = P^{-1}BP$  를 만족할 때, 다음 중 두 행렬이 공유하지 않는 것은? (1.7점)

① 고유다항식      ② 최소다항식  
③ 고윳값      ④ 고유벡터

[31] 다음 중 수렴하는 급수를 모두 고른 것은? (1.7점)

(가)  $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$ 
(나)  $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

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

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

[32] 다음 매개변수방정식이 나타내는 곡선에서,  $\frac{dy}{dx} = \frac{1}{2}$  을 만족하는  $t$  의 개수는? (2.0점)

$$\begin{cases} y = e^t \sin t \\ x = e^t \cos t \end{cases}, \quad 0 \leq t \leq 4\pi$$

①  $4$       ②  $2$       ③  $1$       ④  $0$

[33] 이중적분  $\int_0^1 \int_{\arcsin y}^{\frac{\pi}{2}} \frac{1}{1 + \cos^2 x} dx dy$  의 값은? (2.0점)

①  $\frac{\pi}{2}$       ②  $\frac{\pi}{4}$       ③  $1$       ④  $0$

[34] 곡선  $y = \int_0^{\sqrt{x}} \sqrt{1-t^2} dt$  의  $x = \frac{1}{2}$  에서의 접선의 방정식은? (2.0점)

①  $y = \frac{1}{2}x + \frac{\pi+2}{8}$       ②  $y = \frac{1}{\sqrt{2}}x + \frac{\pi-\sqrt{2}}{2}$   
③  $y = \frac{1}{2}x + \frac{\pi}{8}$       ④  $y = \frac{1}{\sqrt{2}}x + \frac{\pi}{2}$

[35]  $y'' + xy = 0$ ,  $y(0) = 0$ ,  $y'(0) = 1$  의 해가 멱급수  $\sum_{n=0}^{\infty} a_n x^n$  일 때, 멱급수 계수의 쌍  $(a_3, a_4)$  의 값은? (2.0점)

①  $\left(0, -\frac{1}{12}\right)$       ②  $\left(0, \frac{1}{12}\right)$       ③  $\left(0, \frac{1}{4}\right)$       ④  $\left(1, -\frac{1}{4}\right)$

[36]  $y'' - 2y' - 3y = 0$ ,  $y(0) = 6$ ,  $y'(0) = 2$  의 해가  $y(x)$  일 때,  $y(2)$  의 값은? (2.0점)

①  $4e^6 + 4e^{-2}$       ②  $2e^6 + 4e^{-4}$   
③  $2e^6 + 4e^{-2}$       ④  $2e^3 + 4e^{-1}$

[37]  $\frac{dy}{dx} = 4x^3y$  일 때, 다음 중  $y(x)$  가 될 수 있는 것은? (2.0점)

①  $4e^{-2x^4}$       ②  $3e^{2x^4}$       ③  $2e^{x^4}$       ④  $e^{-x^4}$

[38] 다음 이상적분의 수렴, 발산을 올바르게 고른 것은? (2.0점)

(가)  $\int_1^{\infty} \frac{x}{x^3+1} dx$ 
(나)  $\int_0^1 \frac{1}{\sqrt{x}} dx$

① (가) 수렴, (나) 수렴      ② (가) 발산, (나) 수렴  
③ (가) 수렴, (나) 발산      ④ (가) 발산, (나) 발산

[39]  $\frac{1}{2}x^2 - \frac{1}{3}y^3 = \frac{1}{4}$  일 때,  $\frac{d^2y}{dx^2}$  의 값은? (2.0점)

①  $\frac{y^3 - 2x^2}{y^5}$       ②  $\frac{y^3 + 2x^2}{y}$   
③  $\frac{x}{y^2}$       ④  $\frac{y - 2x}{y^3}$

[40] 다음 중 곡면  $x^3 - y^3 + 3x^2 + 3y^2 - 9x = 5$  에 대해 올바른 것을 모두 고른 것은? (2.0점)

(가) 임계점이 4개이다.

(나) 극대점이 1개이다.

(다) 안장점이 1개이다.

(라) 극소점이 1개이다.

- ① (가), (다)

② (나), (라)

③ (가), (나), (다)

④ (가), (나), (라)

[41]  $f(x) = \frac{1}{4}(x^3 + 1)^{3x}$  일 때,  $f'(1)$  의 값은? (2.0점)

- ①  $9 + 3\ln 2$

②  $\frac{3}{2} + 3\ln 2$

③  $9 + 6\ln 2$

④  $\frac{3}{2} + \ln 2$

[42] 함수  $f(x) = x^2 - 3$  과  $g(x) = x - 1$  로 둘러싸인 영역의 넓이는? (2.0점)

- ① 6

②  $\frac{11}{2}$

③ 5

④  $\frac{9}{2}$

[43]  $y = \sin u$ ,  $u = \frac{v}{2} - \frac{2}{v}$ ,  $v = \ln x^2$  일 때,  $x = e$  에서  $\frac{dy}{dx}$  의 값은? (2.0점)

- ①  $\frac{2}{e}$

② 1

③  $\frac{1}{e}$

④ 0

[44] 다음 두 곡선의 한 교점에서, 각 곡선에 접하는 직선 사이의 각을  $\theta$  라고 할 때,  $|\tan \theta|$  의 값은? (2.0점)

$$x^2 + y^2 = 1, \quad 8(x - 1)^2 + 4y^2 = 5$$

- ①  $3\sqrt{3}$

②  $\sqrt{3}$

③  $\frac{\sqrt{3}}{3}$

④  $\frac{\sqrt{3}}{5}$

[45] 함수  $f(x)$  와  $g(x)$  가 구간  $[a, b]$  에서 연속함수일 때, 다음 중 올바른 것을 모두 고른 것은? (2.3점)

(가)  $\left(\int_a^b f(x) \, dx\right)^2 \leq \int_a^b (f(x))^2 \, dx$

(나)  $\int_a^b f(x) \, dx \leq \int_a^b \left(\frac{f(x) + g(x)}{2} + \frac{|f(x) - g(x)|}{2}\right) \, dx$

(다)  $\left|\int_a^b f(x) \, dx\right| \leq \int_a^b |f(x)| \, dx$

- ① (가), (나)

② (가), (다)

③ (나), (다)

④ (가), (나), (다)

[46] 반지름이 2인 구슬을 관통하는 원통형의 구멍이 있다. 구멍을 제외한 구슬의 남은 부분의 부피를  $V$  라고 하자. 구멍을 넓혀 반지름이 1이 될 때, 부피의 변화율  $\frac{dV}{dt}$  의 값은? (단, 원통형 구멍의 중심축은 구슬의 중심을 지나며, 구멍의 반지름  $r$  의 변화율은  $\frac{dr}{dt} = \sqrt{3}$  로 일정) (2.3점)

- ①  $-12\pi$

②  $-6\pi$

③  $-4\pi$

④  $-\pi$

[47] 다음 선형 연립미분방정식이 초깃값  $y_1(0) = 0$ ,  $y_2(0) = 2$  를 만족할 때,  $y_1(1) - y_2(1)$  의 값은? (2.3점)

$$\begin{cases} y_1' = y_1 + 12y_2 \\ y_2' = 3y_1 + y_2 \end{cases}$$

- ①  $e^{-7} - e^5$

②  $3e^7 - 3e^{-5}$

③  $3e^7 - e^{-5}$

④  $e^7 - 3e^{-5}$

[48] 좌표공간에서 다음을 만족하는 영역의 부피는? (2.3점)

$$x^2 + y^2 + z^2 \leq b^2, \quad x^2 + y^2 \leq 3z^2$$

- ①  $\frac{(4 - 2\sqrt{3})\pi}{3} b^3$

②  $\frac{2\pi}{3} b^3$

③  $\frac{(2 - \sqrt{3})\pi}{3} b^3$

④  $\frac{\pi}{3} b^3$

[49] 곡면  $(x - 1)^2 + 2(y - 2)^2 + 3(z - 3)^2 = 1$  위의 점  $P$  에서의 접평면이 원점을 지날 때, 이러한  $P$  를 모두 포함하는 평면의 방정식은? (2.3점)

- ①  $x - 2y + 3z = 10$

②  $x + 4y + 9z = 35$

③  $x + y + z = 4$

④  $4x - 2y + z = 1$

[50] 행렬식이 0 인  $3 \times 3$  행렬  $M$  의 열벡터를 각각  $v_1, v_2, v_3$  라고 할 때, 다음 중 올바른 것을 모두 고른 것은? (2.3점)

(가)  $v_1 \times v_2$  와  $v_3$  은 서로 수직이다.

(나)  $av_1 + bv_2 = v_3$  을 만족하는  $a, b$  를 항상 찾을 수 있다.

(다)  $\{v_1, v_2, v_3\}$  은  $R^3$  의 기저가 될 수 없다.

- ① (가), (나)

② (나), (다)

③ (가), (다)

④ (가), (나), (다)