

2024학년도 숭실대학교 편입학 시험 문제 (자연계)

영 어, 수 학

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] Strong online traffic on Black Friday ①demonstrating a notable pattern of shoppers ②putting time and effort into ③selecting the lowest-cost, best-value merchandise, which tracks data ④flowing through its Commerce Cloud e-commerce service.

[2] A simple definition of the new historicism is ①what it is a method ②based on the parallel ③reading of literary and non-literary texts, usually ④of the same historical period.

[3-6] Choose the most appropriate word for the blank. (각 1점)

[3] When Thomas Hobbes described life in a state of nature as "solitary, poor, nasty, brutish and short," he _____ one of the most celebrated sentences in English language.

- ① accumulated ② penned ③ theorized ④ waded

[4] The emergence of AI applications, such as OpenAI's ChatGPT chatbot, has _____ the integration of AI into everyday life, leading to heightened public awareness and discussion.

- ① avoided ② demoted ③ mitigated ④ propelled

[5] Singapore and Zurich surpassed New York to become the world's most _____ cities to live in this year, according to a new global survey. The sky-high cost of car ownership, pricey alcohol and rising grocery prices saw Singapore pull ahead of the US city.

- ① exertive ② expensive ③ expletive ④ extraneous

[6] Poverty in developing countries is increasing just as the population of urban areas around the globe continues to _____ as well.

- ① accommodate ② enumerate ③ increase ④ expound

[7-10] Choose the word(s) closest in meaning to the underlined. (각 1점)

[7] In a groundbreaking case in Britain regarding whether AI can possess patent rights, a U.S. computer scientist faced a setback on Wednesday, when the UK Supreme Court ruled that AI cannot be considered a patent inventor.

- ① failure ② knack ③ overrule ④ victory

[8] Consumers are being very strategic, wanting to maximize their shopping when they think they'll get the best discounts. The online retail sector is one of the few where the consumer is in the driver's seat, particularly with toys and seasonal holiday merchandise.

- ① goes in his favor
② is in charge
③ is his interest
④ loses the control

[9] The resulting export surplus will be settled by an inflow of bullion, primarily gold and silver.

- ① precious metal
② rich resources
③ exchangeable values
④ mining products

[10] That was the most serious aspersion that he had received in years.

- ① advice ② benediction ③ coercion ④ slander

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

Native North American language speakers number 372,000. Most of these speakers (237,000) live in an American Indian or Alaska Native area (AIANA). People spoke Navajo more often than any other Native North American language. Over 169,000 people spoke this language nationally. Most of these Navajo speakers (112,000) lived in an AIANA. Navajo speakers numbered nearly 9 times larger than the second and third most commonly spoken languages of Yupik and Dakota, with both languages having approximately 19,000 speakers. While 84.5 percent of Yupik speakers lived in an AIANA, 51.5 percent of Dakota speakers did. Although the majority of Native North American language speakers resided in an AIANA, only a small percentage of the people living in these areas actually spoke a Native North American language.

Of people living in an AIANA, 5.4 percent spoke a Native North American language, and this percentage did not vary greatly across age groups. Among those who (A) as American Indian or Alaska Native alone, older people reported speaking a Native North American language more often than younger people. Over 1 in 5 of these people aged 65 and over spoke such a language, while about 1 in 10 people aged 5 to 17 did so. Among those who (A) as American Indian or Alaska Native in combination, people aged 65 and over were slightly less likely than other people to speak a Native North American language, although people aged 5 to 17 and people aged 18 to 64 were not significantly different from each other.

Speakers of Native North American languages concentrated most heavily in the states of Alaska, Arizona, and New Mexico. Sixty-five percent of Native North American language speakers lived in these three states. Just nine counties within these states contained half of the nation's Native North American language speakers. Apache County in Arizona had 37,000 speakers of a Native North American language, making it the highest in the nation. McKinley County, New Mexico, had the second most speakers, 33,000. Together, about 20 percent of all Native North American language speakers in the nation lived in these two counties.

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

- ① identified ② disguised ③ established ④ nominated

[12] Which of the following is NOT mentioned?

- ① the number of speakers of Native North American languages
② the use of Native North American languages by age groups
③ the use of Native North American languages mandated by state policy
④ the number of speakers of Native North American languages by county

[13] Which of the following is NOT true?

- ① Navajo is the mostly spoken Native North American language.
② Among the people of American Indian or Alaska Native in combination, older people were more likely than younger people to speak a Native North American language.
③ More than a half of Native North American language speakers lived in the states of Alaska, Arizona, and New Mexico.
④ Apache County in Arizona had the highest number of speakers of a Native North American language in the nation.

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

We do not know how art began any more than we know how language started. If we take art to mean such activities as building temples and houses, making pictures and sculptures, or weaving patterns, there is no people in all the world without art. If, on the other hand, we mean by art some kind of beautiful luxury, something to enjoy in museums and exhibitions or something special to use as a precious decoration in the best parlour, we must realize that this use of the word is a very recent development and that many of the greatest builders, painters or sculptors of the past never dreamed of it. We can best understand this difference if we think of architecture. We all know that there are beautiful buildings and that some of them are true works. But there is scarcely any building in the world which was not erected for a particular purpose. Those who use these buildings as places of worship or entertainment, or as dwellings, judge them first and foremost by standards of utility. But apart from this, they may like or dislike the design or the proportion of the structure, and appreciate the efforts of the good architect to make it not only practical but "right." In the past the attitude to paintings and statues was often similar. They were not thought of as mere works of art but as objects which had a definite function. He would be a poor judge of houses who did not know the requirements for which they were built. (A), we are not likely to understand the art of the past if we are quite ignorant of the aims it had to serve. The further we go back in history, the more definite but also the more strange are the aims which art was supposed to serve.

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

- ① Conversely ② Alone ③ Ironically ④ Similarly

[15] The thematic emphasis of the paragraph is placed on

- ① the mysterious origin of language and art.
② the essential difference between paintings and sculptures.
③ the function and practicality of art in the past.
④ the transformative power of art today.

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

Eugenics, the selection of desired heritable characteristics in order to improve future generations, typically in reference to humans, was coined as a term in 1883 by British explorer and natural scientist Francis Galton. Influenced by Charles Darwin's theory of natural selection, Galton advocated for a system that would provide "the more suitable races or (1)strains of blood a better chance of prevailing speedily over the less suitable." Social Darwinism, the popular theory in the late 19th century that life for humans in society was ruled by "survival of the fittest," helped advance eugenics into serious scientific study in the early 1900s. By World War I many scientific authorities and political leaders supported eugenics. However, it ultimately failed as a science in the 1930s and '40s, when the assumptions of eugenicists became heavily criticized and the Nazis used eugenics to support the (2)extermination of entire races.

Although eugenics as understood today dates from the late 19th century, efforts to select matings in order to secure offspring with desirable traits date from ancient times. Plato's *Republic* depicts a society where efforts are undertaken to improve human beings through selective breeding. Later, Italian philosopher and poet Tommaso Campanella, in *City of the Sun* (1623), described a utopian community in which only the socially elite are allowed to (3)procreate. Galton, in *Hereditary Genius* (1869), proposed that a system of arranged marriages between men of distinction and women of wealth would eventually produce a gifted race. In 1865 the basic laws of heredity were discovered by the father of modern genetics, Gregor Mendel. His experiments with peas demonstrated that each physical trait was the result of a combination of two units (now known as genes) and could be passed from one generation to another. However, his work was largely ignored until its rediscovery in 1900. This fundamental knowledge of (4)heredity provided eugenicists—including Galton,

who influenced his cousin Charles Darwin—with scientific evidence to support the improvement of humans through selective breeding. For eugenicists, nature was far more contributory than nurture in shaping humanity.

[16] Who is credited with the discovery of the basic laws of heredity in 1865, providing scientific evidence to support eugenics?

- ① Charles Darwin ② Tommaso Campanella
③ Gregor Mendel ④ Francis Galton

[17] Which of the following statements is NOT true?

- ① The term "eugenics" was first used by Francis Galton.
② Galton believed a structured union between distinguished men and affluent women would yield a generation endowed with exceptional abilities.
③ Eugenics faced its downfall in the 1930s and '40s when the underlying assumptions were heavily criticized, and the Nazis exploited it to justify the extermination of entire races.
④ According to eugenicists, the influence of nature is almost identical with that of nurture in molding the characteristics of humanity.

[18] Which word definition is the most accurate?

- ① (1) strain: a type, variety, breed, etc., of an animal
② (2) extermination: the act of taking for granted, or supposing a thing without proof
③ (3) procreate: to render a representation of something, using words, sounds, images, or other means
④ (4) heredity: a process of gradual change in a given system, subject, product, etc., especially from simpler to more complex forms

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

The Twenty-seventh Amendment, ratified in 1992, stands as an amendment to the Constitution of the United States. It specifically stipulates that any alteration to the rate of compensation for members of the U.S. Congress must take effect only after the subsequent election in the House of Representatives. Commonly known as the Congressional Compensation Act of 1789, the Twenty-seventh Amendment was actually the second of 12 amendments proposed by the first Congress in 1789, 10 of which would be ratified and became the Bill of Rights. Absent a time period for ratification by the states, the expiration of which would render the amendment inoperable, it remained dormant for almost 80 years after only six states voted for ratification. In 1873 Ohio ratified the amendment as an expression of dissatisfaction with then-current attempts by Congress to increase the salaries of its members. The amendment once again lay dormant, but in 1978 another state, Wyoming, ratified it. In 1982, after an undergraduate research paper written by Gregory Watson, then a student at the University of Texas in Austin, became the foundation for a movement to curtail political corruption by ratifying the amendment, efforts picked up steam. By May 5, 1992, the requisite 38 states had ratified the amendment (North Carolina had re-ratified it in 1989), and it was certified by the archivist of the United States as the Twenty-seventh Amendment on May 18, 1992, more than 202 years after its original proposal.

[19] Which state ratified the Twenty-seventh Amendment, expressing dissatisfaction with attempts to increase congressional salaries?

- ① North Carolina ② Ohio ③ Texas ④ Wyoming

[20] What event in 1982 led to increased efforts to ratify the Twenty-seventh Amendment?

- ① a movement against political corruption
② the archivist's certification
③ the Congressional Compensation Act
④ the expiration of the ratification time period

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

Statistically, there's a good chance you know somebody who has experienced Long COVID, the name for chronic symptoms including fatigue, brain fog, and pain following a case of COVID-19. About 14% of U.S. adults report having had Long COVID at some point, according to federal data. (1)But many people don't realize that other viruses, even very common ones, can trigger similarly long-lasting and debilitating symptoms. A study published Dec. 14 in *The Lancet Infectious Diseases* focuses on the risk of developing "Long flu" after a severe case of influenza.

Al-Aly and his colleagues used records from the U.S. Department of Veterans Affairs to compare the long-term health outcomes of about 11,000 people hospitalized with influenza from 2015 to 2019 with those of about 81,000 people hospitalized with COVID-19 from 2020 to 2022. The researchers tracked how many people went on to develop any of 94 health risks associated with the two viruses in the year and a half after they were hospitalized. Relative to influenza survivors, people who had had COVID-19 were at increased risk of 64 of the identified complications, including fatigue, mental-health problems, and pulmonary, gastrointestinal, and heart issue. They were also more likely to die during the study period, in keeping with other research comparing the long-term outcomes of the two illnesses. Influenza survivors, (2)consequently, were at increased risk of only six health problems, most of them related to the respiratory and cardiovascular systems. "COVID is still more serious than the flu," Al-Aly says, noting that it affects numerous organ systems while influenza is mostly a respiratory illness. (3)But long-term health problems were common in both groups during the 18 months of follow-up. The researchers recorded about 615 health issues per 100 people in the COVID-19 group, compared with about 537 per 100 people in the influenza group. Those numbers reflect the fact that some people experience numerous chronic symptoms after an infection, Al-Aly says. It's important to note that the people included in the study were all hospitalized, meaning they were very sick during the acute phases of their illnesses. The study population was also overwhelmingly male and older, with an average participant age of 70. (4)Therefore, the results may not translate to the entire population.

[21] Which of the following is NOT appropriate from the context?
① (1) ② (2) ③ (3) ④ (4)

[22] Which of the following is NOT mentioned?
① the range of participants ② the cases of symptom
③ the process of treatment ④ the limitation of research

[23] Which of the following is NOT true?
① Long COVID refers to the long-lasting and debilitating symptom after a case of COVID-19.
② About 14% of U.S. adults may have experienced fatigue, mental-health problems, and heart issue.
③ The COVID-19 group tended to have fewer long-term health issues than the influenza group during the same research period.
④ The results of the study may not apply to all the age groups.

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

The past 18 months have been filled with setbacks for a sector that had until recently been coasting on a decade-plus of frenzied growth. According to Layoffs.fyi, a site that tracks job losses in tech, nearly 260,000 workers have been laid off so far this year, compared with 165,000 last year. These numbers are particularly notable in a year that has seen a mostly-hot labor market. The good news is that, although tech layoffs are elevated far above where they were in early 2022, these numbers are still way lower than they were at the beginning of the year. In January, some 90,000 workers were laid off across

276 companies, Layoffs.fyi found. Last month, the total was closer to 8,000. But the broader tech environment, especially for start-ups, is brutal: Erin Griffith reported in *The New York Times* last week that about 3,200 venture-backed companies were wiped out in 2023.

The long tail of over-hiring during the flush early days of the pandemic is the main factor driving current layoffs in tech, Roger Lee, the creator of Layoffs.fyi, told me. As my colleague Derek Thompson wrote in January, "When interest rates were low, investors valued growth narratives, and tech companies had a monopoly on these narratives . . . When inflation and interest rates increased, the companies that were making long-term promises were most at risk, and they got clobbered." Tech firms are still correcting for the reams of workers they hired when it seemed like the party would never end. And now AI is adding to some tech companies' problems, threatening their core operations. Many companies' projections got hammered by interest rates remaining higher this year than executives had hoped, so some that have already laid off employees "are going back to the well and making further cuts," Lee explained.

Some of this timing is cyclical. The end of the year is historically a popular time for layoffs. It marks the final stretch of the fiscal year for many organizations; companies are taking stock of that year's performance, and planning ahead for the next one. In the short term, we may continue to see trends such as cuts continue, Lee said. Inflation has moderated, and some economists are cautiously predicting that the Federal Reserve may lower rates in 2024; that would make investing in companies cheaper and could spur growth in the tech sector next year, Nick Bunker, the economic-research director at Indeed Hiring Lab, told me. But he doesn't predict rapid gains in tech hiring, in part because companies may have learned a thing or two from the over-hiring spree of 2021. Tech executives have been chastened by the blows of the past few years. Many are being more disciplined in their approach to hiring, Lee said, and "they are focusing more on efficiency, rather than growth at all costs."

[24] Which statement among the following is NOT true?
① According to Layoffs.fyi, 260,000 workers in the tech sector have been laid off so far this year.
② 3,200 venture-backed companies were wiped out in 2023.
③ Over-hiring during the early days of the pandemic is the main factor driving current layoffs in the tech sector.
④ According to Roger Lee, tech firms are still undergoing layoffs due to economic downturn.

[25] Which statement among the following is true?
① The end of the year is a popular time for layoffs because employees demand year-end bonuses.
② About tech hiring in the near future, Nick Bunker predicts continuous layoffs.
③ It is highly probable that the Federal Reserve will keep interest rates steady due to inflation in 2024.
④ As mentioned in the text, growth at all costs is the approach of many tech executives toward hiring.

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[26] 극한값 $\lim_{x \rightarrow 1} \ln x^{\frac{1}{1-x}}$ 을 구하면? (1.7점)

- ① -1 ② 0 ③ 1 ④ e

[27] 급수 $\sum_{n=1}^{\infty} \frac{(-2)^n x^n}{\sqrt[3]{n+1}}$ 의 수렴반경을 구하면? (1.7점)

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

[28] 직선 $y = 6x + k$ 가 곡선 $y = 3x^3$ 과 2개 이상의 교점을 갖는다고 할 때, 이를 만족하는 k 의 가장 큰 값과 가장 작은 값을 곱하면? (1.7점)

- ① $-\frac{32}{3}$ ② $-\frac{16}{3}$ ③ $-\frac{8}{3}$ ④ $-\frac{4}{3}$

[29] $f(x) = 1 + 2x + x^3 + e^x$ 일 때, $(f^{-1})'(2)$ 를 구하면? (1.7점)

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

[30] $y = \tan u$ 이고, $u = v - \frac{1}{v}$, $v = \ln x$ 일 때, $x = e$ 에서 $\frac{dy}{dx}$ 를 구하면? (1.7점)

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

[31] 함수 f 는 모든 실수구간에서 연속이고, $F'(x) = f(x)$ 를 만족할 때, $\int_1^3 f(3x)dx$ 의 값을 구하면? (1.7점)

- ① $\frac{1}{3}(F(3) - F(1))$ ② $\frac{1}{3}(F(9) - F(3))$
 ③ $3(F(3) - F(1))$ ④ $3(F(9) - F(3))$

[32] 다음 급수의 수렴, 발산을 올바르게 고른 것은? (2.0점)

(가) $\sum_{n=2}^{\infty} \frac{\sqrt{n+1}}{\sqrt{n^3-1}}$	(나) $\sum_{n=1}^{\infty} \frac{n+2}{n^2+2} \sin \frac{n\pi}{2}$
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- ① (가): 수렴, (나): 수렴 ② (가): 수렴, (나): 발산
 ③ (가): 발산, (나): 수렴 ④ (가): 발산, (나): 발산

[33] 다음 중 항상 참인 것을 모두 고르면? (2.0점)

(가) $\lim_{x \rightarrow 3} f(x) = 5$ 이고 $\lim_{x \rightarrow 3} g(x) = 0$ 이면, $\lim_{x \rightarrow 3} [f(x)/g(x)]$ 는 존재하지 않는다.
(나) $\lim_{x \rightarrow a} f(x)$ 와 $\lim_{x \rightarrow a} g(x)$ 둘 다 존재하지 않으면, $\lim_{x \rightarrow a} [f(x) + g(x)]$ 도 존재하지 않는다.
(다) $\lim_{x \rightarrow a} f(x)$ 가 존재하고 $\lim_{x \rightarrow a} g(x)$ 가 존재하지 않으면, $\lim_{x \rightarrow a} [f(x) + g(x)]$ 는 존재하지 않는다.
(라) $\lim_{x \rightarrow 3} [f(x)g(x)]$ 가 존재하면, 이 극한값은 $f(3)g(3)$ 과 같다.

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

[34] $x^2 - xy + y^2 = 3$ 인 곡선 C 위의 점 $A(1, -1)$ 에서의 접선과 수직인 직선이 만나는 곡선 C 위의 다른 점 B 가 있을 때, 선분 \overline{AB} 의 길이를 구하면? (2.0점)

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

[35] 미분가능한 함수 $g(u, v)$ 에 대하여 $\frac{\partial g}{\partial u}(0, v) = \sqrt{v}$, $\frac{\partial g}{\partial v}(0, v) = \sqrt{v} - 1$ 이라고 할 때, 함수 $f(x, y) = g(y \cos x + e^x, 4y^2)$ 에 대하여 $\frac{\partial f}{\partial y}(0, -1)$ 을 구하면? (2.0점)

- ① -6 ② -2 ③ 10 ④ 34

[36] $y \leq -x^3 - x^2 + x + 1$, $x \geq 0$, $y \geq 0$ 를 만족하는 영역을 y 축 둘레로 회전시켜 얻은 입체의 부피를 $\frac{a}{b}\pi$ 라고 할 때, $a+b$ 의 값은?
(단, a, b 는 서로 약분되지 않는 자연수이다.) (2.0점)

- ① 17 ② 33 ③ 53 ④ 83

[37] 다음은 정적분 $\int_a^b f(x)dx$ 의 근사값을 구하는 방법이다.

구간 $[a, b]$ 를 길이가 $\Delta x = \frac{b-a}{n}$ 로 같은 n 개의 부분구간 $[x_{i-1}, x_i]$ 으로 나누면, $\int_a^b f(x)dx \approx \sum_{i=1}^n f(\bar{x}_i)\Delta x$ 이다.
여기서 $\bar{x}_i = \frac{1}{2}(x_{i-1} + x_i)$ 는 부분구간 $[x_{i-1}, x_i]$ 의 중점이다.

$n=4$ 에 대하여 정적분 $\int_{-0.5}^{3.5} \frac{x^2}{x^2+1} dx$ 의 값을 소수점 아래 첫째 자리까지 근사하면? (2.0점)

- ① 2.2 ② 2.4 ③ 2.6 ④ 2.8

[38] 함수 $f(x)$ 를 $f(x) = \frac{d}{dx} \int_x^{2x^2} \cos^2 t dt$ 라고 정의할 때, 정적분 $\int_0^{2\sqrt{\pi}} f(s)ds$ 의 값을 구하면? (2.0점)

- ① $\sqrt{\pi}$ ② π ③ $2\sqrt{\pi}$ ④ 2π

[39] 다음 적분 중 수렴하는 것의 개수를 구하면? (2.0점)

(가) $\int_{-\infty}^0 x^2 e^x dx$ (나) $\int_1^{\infty} \frac{2+e^{-2x^2}}{1+\ln x} dx$
(다) $\int_0^{\frac{\pi}{3}} \frac{1}{x^2 \sqrt{\sin x}} dx$ (라) $\int_0^{\frac{2}{3}} \frac{1}{\sqrt{|3x-1|}} dx$

- ① 1개 ② 2개 ③ 3개 ④ 4개

[40] 정적분 $\int_{-\infty}^{\infty} (1+x^2)e^{-x^2} dx$ 의 값을 구하면? (2.0점)

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

[41] 다음 중 참인 것을 모두 고르면? (2.0점)

(가) 극곡선 $r = \sin 2\theta - 1$ 과 $r = 1 - \sin 2\theta$ 는 서로 다른 그래프이다.
(나) 매개변수방정식 $x = 4\sin 3t, y = 4\cos 3t$ ($0 \leq t \leq 2\pi$), 직방정식 $r = 4$, 직교방정식 $x^2 + y^2 = 16$ 의 그래프는 모두 같다.
(다) 매개변수방정식 $x = t^2, y = t^4$ 의 그래프와 $x = t^3, y = t^6$ 의 그래프는 서로 다르다.

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

[42] 다음 중, 행렬 $A = \begin{bmatrix} 4 & 2 & 2 \\ 2 & 4 & 2 \\ 2 & 2 & 4 \end{bmatrix}$ 의 고유벡터(eigenvector)로 적절하지 않은 것은? (2.0점)

- ① $\begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix}$ ② $\begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix}$ ③ $\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$ ④ $\begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix}$

[43] 행렬 A 의 고윳값이 1, 6이고 각각의 고유벡터가 $\begin{pmatrix} 2 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ -2 \end{pmatrix}$ 일 때, 다음 보기 중 참인 것의 개수는? (단, I_2 는 2×2 단위행렬이다.) (2.0점)

(가) A 는 대칭행렬이다. (나) A 는 대각행렬이다.
(다) $\det(A) = 6$ (라) $\det(A^3 + I_2) = 432$
(마) $\text{tr}(A) = 7$ (바) A^2 의 모든 원소의 합은 9이다.

- ① 2개 ② 3개 ③ 4개 ④ 5개

[44] 초깃값 $y(0) = 5$, $y'(0) = 4$ 를 만족하는 $2y'' - 5y' + 2y = 0$ 의 해가 $y(x)$ 일 때, $y(\ln 4)$ 의 값은? (2.0점)

- ① 6 ② 12 ③ 18 ④ 24

[45] 함수 $f(x) = \frac{1}{1+x^2}$ 의 매클로린 급수를 $\sum_{n=0}^{\infty} a_n x^n$ 이라고 하자. 함수 $g(x)$, $h(x)$ 의 매클로린 급수가 각각 $\sum_{n=3}^{\infty} a_n x^n$, $\sum_{n=5}^{\infty} a_n x^n$ 과 같이 표현된다고 할 때, $g'(1) + h'(1)$ 의 값을 구하면?

(단 $g(x)$, $h(x)$ 는 해석함수이다.) (2.3점)

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

[46] 곡선 $x^4 + y^4 = x^2 + y^2$ 위의 점이 가질 수 있는 y 좌표 중, 가장 큰 값과 가장 작은 값을 곱하면? (2.3점)

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

[47] 다음 삼중적분의 값을 각각 A , B 라고 하자. 이 때, $A - B$ 의 값은? (2.3점)

$$A = \int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{\sqrt{x^2+y^2}}^{4-\sqrt{x^2+y^2}} \sqrt{x^2+y^2} dz dy dx$$

$$B = \int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{\sqrt{x^2+y^2}}^{2-\sqrt{x^2+y^2}} \sqrt{x^2+y^2} dz dy dx$$

- ① 3π ② 4π ③ 5π ④ 6π

[48] 두 원기둥 $x^2 + y^2 = 4$ 와 $x^2 + y^2 = 9$ 사이에 있는 쌍곡포물면 $z = y^2 - x^2$ 의 곡면 넓이가 $\frac{\pi}{a}(b\sqrt{b} - c\sqrt{c})$ 일 때, $a + b - c$ 의 값을 구하면? (단, a , b , c 는 서로 약분되지 않는 자연수이다.) (2.3점)

- ① 23 ② 24 ③ 25 ④ 26

[49] 삼차원 공간에서 세 개의 벡터 $\mathbf{a}_1 = \langle 1, 0, 1 \rangle$, $\mathbf{a}_2 = \langle 1, 1, 0 \rangle$, $\mathbf{a}_3 = \langle 1, 2, 0 \rangle$ 으로 이루어진 기저 $\{\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3\}$ 으로부터 그람-슈미트 (Gram-Schmidt) 과정을 거쳐 순서대로 만들어진 직교기저가 $\{\mathbf{w}_1, \mathbf{w}_2, \mathbf{w}_3\}$ 이라고 하자. 이때, $\|\mathbf{w}_1\| \|\mathbf{w}_2\| \|\mathbf{w}_3\|$ 을 구하면? (단, $\|\mathbf{w}\|$ 는 \mathbf{w} 의 길이이다.) (2.3점)

- ① 1 ② 2 ③ 3 ④ 4

[50] $y = f(x)$ 가 초깃값 $f(0) = 0$, $f'(0) = 3$, $f''(0) = 10$ 을 만족하는 미분방정식 $y''' - 3y'' + y' - 3y = 0$ 의 해라고 하자. 이때, $-1 \leq x \leq 1$ 에서 방정식 $f(x) = 0$ 의 근의 개수는? (2.3점)

- ① 0개 ② 1개 ③ 2개 ④ 3개