

2022학년도 송실대학교
편입학 필답고사
시험 문제



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2022학년도 송실대학교 편입학 시험 문제 (자연계)

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

[1] For the leaders of Xioashan, balance is key to sustainability. Xioashan ① is achieving this balance through its Green Rural Revival Program, ② which injects new knowledge, ③ approaches into existing hamlets, and designs new villages ④ used sustainability principles that meet unique local needs.

[2] She is one of a handful of women ① running stock exchanges, both in the US and ② abroad. What is it about exchanges, ③ comparing with other corners of the finance industry, that has helped women ④ rise to the top?

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

[3] Progress flows from the gradual _____ of knowledge. In the case of the COVID-19 vaccines, it started with the initially painstaking process of decoding the genomes of all living things and shared the information with one another.
① exclusion ② accretion ③ disposal ④ monopoly

[4] It will mean costly efforts to make homes, transport and infrastructure much more _____ to heat, rain and droughts. It may also mean expanding and formalizing our town, for cleaning up after disaster.
① resilient ② hazardous ③ vulnerable ④ acerbic

[5] According to one study, only 1 in 4 employees believed empathy in their organizations was "sufficient." Companies know they must start thinking seriously about addressing their empathy _____ or risk losing workers.
① deficit ② alimant ③ competition ④ precocity

[6] Using our natural capital has a delayed cost, as well as an increasingly intolerable impact on all those who suffer from climate change and pollution. This is why it is _____ to put social, environmental and good-governance objectives at the heart of society.
① imperative ② primitive ③ optional ④ political

[7-10] Choose the expression that is closest in meaning to the underlined part. (각 1점)

[7] The pivot to remote work has made possible a level of work-life balance that those in their 20s and early 30s, the first generation where half of kids had two parents working full-time, had never imagined.
① policy ② hub ③ hindrance ④ consideration

[8] Despite the stifling heat and humidity, the lobby of the hotel several stories below is brimming with life unthinkable just a few months before.
① communicating ② diminishing
③ overflowing ④ maintaining

[9] At its base level, an NFT, or nonfungible token, is simply a file type. But unlike a traditional PDF or JPEG, NFTs are "minted" on the blockchain, a tamper-resistant, decentralized digital public ledger that also supports cryptocurrencies like Bitcoin and Dogecoin.

- ① pocket manual ② warranty file
③ account book ④ reference journal

[10] So much time has passed. So many firsts. Yet the question lingers in my mind: I will always wonder if he would love me more if I had carried her. Would our bond be even tighter?
① strikes ② remains ③ hides ④ fades

[11-12] Read the following passage and answer the questions. (각 2.5점)

Scroll through Instagram, TikTok or Pinterest this winter and you'll see thousands of youthful faces framed inside what looks like an overgrown knitted sock. The balaclava, sometimes called a ski mask, has become an unusual sartorial staple and a late entry in the race to claim 2021's hottest fashion trend. Typically made from wool, mohair or some form of yarn, the headpiece leaves room for a sizable face hole or just for the eyes. On TikTok, at the time of writing, there are 102.6 million videos attached to the hashtag "#balaclava," while another 248,000 people on Instagram have posted about the offbeat accessory. Interest is up on Google too, with the question of "how to knit a balaclava" growing more than 5000% in the past 12 months likely thanks to Gen Z's favorite pandemic hobby.

(A), the balaclava is more often associated with war tactics than runway trends. These masks take their name from the Ukrainian port town of Balaclava, the backdrop for a battle in 1854 during the Crimean War, where British and Irish troops were sent to fight Russian soldiers in freezing conditions. Morale during the war was low, not least because the UK army arrived with nothing but their worn-out summer uniform. When news of this scandalous lack of supplies traveling back to the UK, British women began knitting full-face hats for their men and shipping them out to the barracks. The knitted headgear has since become symbolic of the eastern European militia after being used by pro-Russian separatist demonstrators to avoid surveillance. To many, they read as markers of threatening, anti-conformist behavior, but in recent years, more whimsical connections have been made, with candy-colored and bunny-eared versions easily found.

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

- ① Culturally ② Importantly
③ Historically ④ Necessarily

[12] Which of the following is true about the balaclava?

- ① It was first knitted by Ukrainian women.
- ② It originated from a ski mask.
- ③ It was named after soldiers in the Crimean War.
- ④ It was first worn by British soldiers.

[13-15] Read the following passage and answer the questions. (각 2.5점)

The earliest cities developed for the most part with chaotic street systems and land uses. Enterprises and residences were located wherever the owners decided they should be. Yet, the classic civilizations did engage in forms of planning. Often building was carried out according to some overarching symbolic scheme belonging to the religious beliefs of the people. During the medieval period in Europe and in some places in Asia, cities were built with planned fortifications in the interests of self-defense. When capitalist industrialization appeared in the 1800s, first in Europe, then in the US, new conceptions of how to guide city growth emerged and replaced the rationale for religious thinking or defense. Some of the most notable ideas in the 19th century sought to overcome the ills of pollution and public health crisis so characteristic of the industrial town under capitalism.

One important 19th century thinker was Ebenezer Howard. He viewed the industrial city as simply too large. It had lost its human scale. He proposed, instead, that new development follow a *garden city* approach that melded factory construction with countryside living. The garden city, then, represented the best of city and country living. Howard's approach gave rise to the *new town* movement in England which resulted in construction of factory centers located outside the large cities. In the US, both Garden City, Long Island, New York, and Baldwin Hills, outside of Los Angeles, California were built on this model during the early part of the 20th century.

Historically, the first steps in the direction of modern city planning can be traced to practices establishing districts within which certain rights of citizens were legally curbed. In the late European middle ages, slaughtering places for cattle were located on the outskirts of town so that offensive odors would not permeate the city. During the 1700s in Boston the segregation of the storage place for gunpowder away from the city center was one of the first recorded acts of *zoning*, the separation of social functions in separate land use districts. Early zoning was confined to the regulation of business locations that were either a public menace, such as gunpowder, or public nuisance, such as slaughterhouses or laundries.

[13] Which of the following is NOT mentioned?

- ① urban designing ② landscape gardening
- ③ district rearranging ④ segregation of city district

[14] Which of the following is NOT true about Howard's view of cities?

- ① He introduced the idea of the garden city approach.
- ② The industrial city style was too large in size.
- ③ He influenced the new town movement in England.
- ④ Factories were to be built in the center of cities.

[15] Which of the following is NOT true?

- ① The land use of the earliest cities was not well planned.
- ② Capitalism tried to overcome the ills of pollution and public health crisis.
- ③ Boston's regulation of business locations was an example of zoning.
- ④ Certain individual rights were restricted in the process of city planning.

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

People worldwide are living longer. Today most people can expect to live into their sixties and beyond. Every country in the world is experiencing growth in both the size and the proportion of older persons in the population.

By 2030, 1 in 6 people in the world will be aged 60 years or over. At this time the share of the population aged 60 years and over will increase from 1 billion in 2020 to 1.4 billion. By 2050, the world's population of people aged 60 years and older will double (2.1 billion). The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million.

While this shift in distribution of a country's population towards older ages, known as population aging, started in high-income countries (for example in Japan 30% of the population is already over 60 years old), it is now low- and middle-income countries that are experiencing the greatest change. By 2050, two-thirds of the world's population over 60 years will live in low- and middle-income countries.

The United Nations General Assembly declared 2021-2030 the Decade of Healthy Aging and asked WHO to lead the implementation. The Decade of Healthy Aging is a global collaboration bringing together governments, civil society, international agencies, professionals, academia, the media and the private sector for 10 years of concerted, catalytic and collaborative action to foster longer and healthier lives.

The Decade builds on the WHO Global Strategy and Action Plan and the United Nations Madrid International Plan of Action on Aging, and supports the realization of the United Nations Agenda 2030 on Sustainable Development and the Sustainable Development Goals.

The Decade of Healthy Aging seeks to reduce health inequities and improve the lives of older people, their families and communities through collective action in four areas: changing how we think, feel and act towards age and ageism; developing communities in ways that foster the abilities of older people; delivering person-centered integrated care and primary health services responsive to older people; and providing older people who need it with access to quality long-term care.

[16] Which of the following is true by 2030?

- ① More than 30% of people in the world will be 60 years and older.
- ② The number of 60 years and older people will be around 2.1 billion.
- ③ Japan will implement an international plan of Action on Aging.
- ④ Older people will be provided with better access to quality care.

[17] What do you expect to happen by 2050?

- ① Those who are 60 years old and over will triple.
- ② Two thirds of people over 60 will live in high-income countries.
- ③ The number of 80 years and older people will be 426 million.
- ④ The number of old and young people will be in a good balance.

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

A “charismatic little fish” declared extinct in the wild has been reintroduced to its native Mexico after being bred in an aquarium at Chester zoo. Named after the Tequila volcano, which looms north of its native habitat, the Tequila fish was discovered in 1990 in the Teuchitlán River. Recent studies have confirmed that the fish are thriving and already breeding in the Teuchitlán. Experts say it has created a blueprint for future reintroductions of other highly endangered fish species, with a rescue mission for another, the golden skiffia, now under way. Prof. Omar Dominguez said: “This is the first time an extinct species of fish has ever been successfully reintroduced in Mexico and so it’s a real landmark for conservation. It’s a project which has now set an important precedent for the future conservation of the many fish species in the country that are threatened or even extinct in the wild but which rarely take our attention.” In preparation for the reintroduction, 40 males and 40 females from the colony were released into large, artificial ponds at the university. This exposed them to a semi-natural environment where they would encounter fluctuating resources, potential competitors, parasites, and predators such as birds, turtles and snakes. After four years, this population was estimated to have increased to 10,000 individuals and became the source for the reintroduction to the wild.

A long-term monitoring program was established involving local people trained to assess water and habitat quality. Dr. Gerardo Garcia, Chester zoo’s curator of lower vertebrates and invertebrates, said the successful reintroduction was an important moment in the battle for species conservation. “With nature declining globally at rates unprecedented in human history and the rate of extinction accelerating, this is a rare success story. We now have a blueprint for what works in terms of recovering these delicate fish species in Mexico and already we’re on to the next one, a new rescue mission for the golden skiffia is already well under way.”

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

- ① The Name of “Charismatic Little Fish”
- ② The Cost of New Breeding Method
- ③ How to Revive the Golden Skiffia
- ④ The Reintroduction of Near-extinct Fish

[19] Which of the following is NOT true about the Tequila fish in artificial ponds?

- ① They were safe from predators.
- ② They competed to find their food.
- ③ They found their mates to reproduce.
- ④ They were released to the wild.

[20] Which of the following is true?

- ① The Tequila fish was named after those who discovered it.
- ② The extinction of the Tequila fish proved true.
- ③ Experiment in reintroduction lasted for years.
- ④ The rescue of the golden skiffia was completed.

[21-22] Read the following passage and answer the questions. (각 3점)

(A) Stagflation is a combination of the words stagnation and inflation. It describes an economic condition characterized by slow growth and high unemployment (economic stagnation) mixed with rising prices (inflation).

The term appeared as early as 1965, when British Conservative Party politician Ian Macleod in a speech to the House of Commons said: “We now have the worst of both worlds, not just inflation on the one side or stagnation on the other, but both of them together. We have a sort of ‘stagflation’ situation and history in modern terms is indeed being made.”

(B) After all, unemployment and inflation rates generally move in opposite directions. However, as the “Great Inflation” period of the 1970s ultimately proved, stagflation is real, and it can have a devastating effect on the economy.

(C) Stagflation and inflation are related, but they shouldn’t be confused. The term inflation refers to a sustained increase in the average price level of all goods and services, not just a few of them, in an economy over time. Inflation happens when the money supply grows at a faster rate than the economy can produce goods and services.

Stagflation happens when inflation exists in tandem with slow economic growth and high unemployment. Typically, these economic conditions don’t occur together. Unemployment and inflation tend to be inversely correlated. So, as unemployment rates increase, inflation usually decreases and vice versa. Of course, as the stagflation of the 1970s illustrated, this relationship isn’t always stable or predictable.

(D) Stagflation is a perfect storm of economic ills: slow economic growth, high unemployment, and high prices. The two root causes of stagflation economists generally agree upon are supply shocks and fiscal and monetary policies. For households, stagflation means people are earning less money while spending more on everything from food and medicine to housing and consumer products. As consumer spending slows, corporate revenue declines, exacerbating the overall effect on the economy.

Initially, many economists believed stagflation wasn't possible.

[21] Which of the following is best for the sentence in the box?

- ① (A) ② (B) ③ (C) ④ (D)

[22] Which of the following is NOT true?

- ① Slow growth and high unemployment with rising prices characterize stagflation.
- ② Stagflation is a made-up word describing a British economic situation in the 1960s.
- ③ During the stagflation, people tend to earn less money and spend even less.
- ④ The primary causes of stagflation are supply shocks and fiscal and monetary policies.

[23-25] Read the following passage and answer the questions. (각 3점)

(A) our society is still haunted by gender stereotyped ideas about the mythic image of boys and men as stoic loners who thrive on solitude, we tend to misunderstand and greatly undervalue boys' friendships. Psychologists have often failed to see the significant ways in which boys express their yearnings for human closeness and connection. They have underestimated the degree to which boys rely on their closest male and female friends to survive.

Part of the reason we do not fully appreciate the richness and prevalence of boy's friendships is that at first glance, they may not appear as emotionally deep and meaningful as girls' relationships. However, upon a closer look it is clear that boys have friendships of tremendous depth and intensity. Boys' friendships are simply governed by different rules and expressed differently than girls' relationships.

To fully appreciate male friendships, we must put aside traditionally female standard of intimacy and attachment. In doing so, we may be surprised what the psychiatrist Harry Stack Sullivan termed "chumships," that is, boys' particular sense of camaraderie and love. For instance, in public boys often use action-oriented behavior to express their connection to other boys. They may race each other, climb a tree together, or play against one another in tennis. Such behavior can be seen as "doing together" or caring through action. In these settings, boys generally forgo the kind of quiet one-on-one verbal sharing that we typically associate with girls. Boys do share intimate moments of relating, but they tend to do so privately, away from the group, where such exchanges might expose them to shame or embarrassment.

In addition to this same-gender friendships, most boys develop healthy, positive, and deep relationships with girls. This finding undermines the myth that young preadolescent boys are always "less mature" than girls their age and that, because their play styles are different, boys and girls are unable to form important connections with one another. It also debunks the myths that adolescent boys are inept at or uninterested in friendship with girls and that boys this age impart love, affection, and empathy only in the context of sexual conquest.

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

- ① Because ② However ③ If ④ Though

[24] Which of the following is NOT true about boys?

- ① They need friendship with both boys and girls for survival.
② Their expression of friendship differs from that of girls'.
③ They need close human relationship with each other.
④ They share no verbal exchange in private circumstances.

[25] Which of the following is NOT true?

- ① Misunderstanding of boys' attitude has little to do with the mythic images of them.
② Even psychologists misjudge the importance of boys' need for friendship.
③ To fully understand boys, we should do away with the norm used to judge girls.
④ Sullivan calls boys' particular friendships and affection between themselves chumships.

<수학문제는 다음 면에 계속 됩니다>

[26] 극한 $\lim_{x \rightarrow 0} x^2 \left[1 + \sin^2 \frac{2\pi}{x} \right]$ 의 값은? (1.7점)

- ① 2π ② 1 ③ 0 ④ 2

[27] $f(x) = \ln \left| \cos \frac{\pi}{2x} \right|$ 일 때, $f'(2)$ 의 값은? (1.7점)

- ① $\frac{\pi}{8}$ ② $\frac{\pi}{4}$ ③ π ④ 2π

[28] 정적분 $\int_0^{\sqrt{2}} x^3 \sqrt{x^2+2} dx$ 의 값은? (1.7점)

- ① $\frac{8}{15}(2+\sqrt{2})$ ② $\frac{8}{15}(2-\sqrt{2})$
 ③ $\frac{16}{15}(2+\sqrt{2})$ ④ $\frac{16}{15}(2-\sqrt{2})$

[29] 급수 $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{6^n} (2x+5)^n$ 의 수렴반경은? (1.7점)

- ① 6 ② 3 ③ 2 ④ 5

[30] x 와 y 는 t 의 함수이고, $y^2 - \frac{1}{2}xy = 6$ 이다. $t=t_0$ 에서 $x=2$, $y > 0$, $\frac{dy}{dt} = 2$ 이다. 이때, $t=t_0$ 에서 $\frac{dx}{dt}$ 의 값은? (1.7점)

- ① 4 ② 6 ③ $\frac{20}{3}$ ④ $\frac{2}{5}$

[31] 직교방정식 $(x-2)^2 + y^2 = 4$ 를 극방정식으로 나타내면? (1.7점)

- ① $r = 4 + 8 \cos \frac{\theta}{2}$ ② $r = 4 + 8 \sin \frac{\theta}{2}$
 ③ $r = 4 - 8 \cos^2 \frac{\theta}{2}$ ④ $r = 4 - 8 \sin^2 \frac{\theta}{2}$

[32] $x\{f(x)\}^2 + 2f(x) = 8$ ($f(x) > 0$) 일 때, $f'(1)$ 의 값은? (2.0점)

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

[33] 삼차함수 $f(x) = ax^3 + bx^2 + cx + d$ 의 변곡점에 대한 설명 중 옳바른 것을 모두 고른 것은? (2.0점)

(가) $f(x)$ 의 극점이 존재하는 경우 극댓값과 극솟값의 평균은 변곡점의 y 좌표와 항상 같다.
 (나) 변곡점의 x 좌표는 방정식 $f(x) = 0$ 의 실근의 평균과 항상 같다.
 (다) $f(x)$ 의 변곡점을 지나면서 $f(x)$ 에 접하는 직선은 항상 존재한다.

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

[34] 구간 $[2, 5]$ 에서 적분가능한 함수 f 의 정적분 $\int_2^5 f(x) dx$ 를 아래와 같이 표현할 때, 가 에 들어갈 수식으로 가능한 것은? (2.0점)

$$\int_2^5 f(x) dx = \lim_{n \rightarrow \infty} \sum_{k=1}^n \text{가}$$

- ① $f\left(2 + \frac{3k}{n}\right) \frac{3}{n}$ ② $f\left(2 + \frac{3k}{n}\right) \frac{5}{n}$
 ③ $f\left(\frac{3k}{n}\right) \frac{3}{n}$ ④ $f\left(\frac{3k}{n}\right) \frac{5}{n}$

[35] $0 \leq x \leq \frac{\pi}{2}$ 에서 정의된 두 함수 $y = \cos x$ 와 $y = \sin 2x$ 로 둘러싸인 영역을 x 축 둘레로 회전시킬 때 생기는 회전체의 부피는? (2.0점)

- ① $\frac{3\sqrt{3}\pi}{16}$ ② $\frac{3\sqrt{3}\pi}{8}$ ③ $\frac{\sqrt{3}\pi}{4}$ ④ $\frac{2\sqrt{3}\pi}{15}$

[36] 다음 중 발산하는 급수를 모두 고른 것은? (2.0점)

| | |
|---|--|
| (가) $\sum_{n=1}^{\infty} \frac{4}{\pi^n}$ | (나) $\sum_{n=1}^{\infty} \frac{2}{4+e^{-n}}$ |
| (다) $\sum_{n=1}^{\infty} \frac{1+\cos \frac{n\pi}{2}}{e^n}$ | (라) $\sum_{n=1}^{\infty} \frac{e^n}{n^2}$ |

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

[37] 방정식 $|x|+|y|+|z|=1$ 의 그래프의 형태는? (2.0점)

- ① 삼각뿔 ② 정사면체 ③ 정육면체 ④ 정팔면체

[38] $-1 \leq t \leq 5$ 에서 정의된 매개변수 방정식 $x=t^2-2t+12$, $y=4t^2-t^3$ 이 나타내는 곡선과 직선 $y=2x$ 와의 최단거리는? (2.0점)

- ① $\frac{16}{\sqrt{5}}$ ② $\frac{12}{\sqrt{5}}$ ③ $\frac{18}{\sqrt{5}}$ ④ $\frac{14}{\sqrt{5}}$

[39] 다음 극곡선의 대칭축을 올바르게 고른 것은? (2.0점)

| |
|---|
| (가) $r=1-\cos\theta, 0 \leq \theta \leq 2\pi$ |
| (나) $r=\cos 3\theta, \frac{\pi}{6} \leq \theta \leq \frac{5\pi}{6}$ |

- ① (가) x 축, (나) x 축 ② (가) x 축, (나) y 축
 ③ (가) y 축, (나) x 축 ④ (가) y 축, (나) y 축

[40] 3×3 행렬 A 의 모든 고윳값들의 곱은 3이고 $A^2B=I$ 라고 할 때, 행렬 B 의 모든 고윳값들의 곱은? (단, I 는 단위행렬) (2.0점)

- ① $\frac{1}{3}$ ② $\frac{1}{9}$ ③ 3 ④ 9

[41] 행렬 $A = \begin{bmatrix} 1 & 2 & 1 \\ 1 & 1 & -2 \\ 4 & \alpha & \beta \end{bmatrix}$ 의 계수(rank)가 2일 때, $\alpha^2 + \beta^2$ 의 최솟값은? (2.0점)

- ① 10 ② 20 ③ 40 ④ 50

[42] 다음 중 선형미분방정식을 모두 고른 것은? (2.0점)

| |
|---|
| (가) $x^2dy+(x+y^2)dx=0$ |
| (나) $e^x \frac{d^2y}{dx^2} + x^2y = 0$ |
| (다) $\left(\frac{dy}{dx}\right)^3 + xy = 0$ |

- ① (가) ② (나)
 ③ (가), (나) ④ (나), (다)

[43] $2y''+3y'+y=0, y(0)=2, y'(0)=0$ 의 해가 $y(t)$ 일 때, $2y(2)+y(4)$ 의 값은? (2.0점)

- ① $-2e^{-1}+8e^{-4}$ ② $8e^{-1}-2e^{-4}$
 ③ $-2e^{-1}+8e^{-2}+8e^{-4}$ ④ $4e^{-1}+2e^{-2}-2e^{-4}$

[44] \mathcal{L} 을 라플라스 변환이라고 하고, \mathcal{L}^{-1} 을 \mathcal{L} 의 역변환이라고 하자. $f(t) = \mathcal{L}^{-1}\left[\frac{3s+5}{s^2+2s-3}\right]$ 일 때, $f(\ln 2)$ 의 값은? (2.0점)

- ① $\frac{9}{4}$ ② $\frac{15}{16}$
 ③ $\frac{33}{8}$ ④ $\frac{17}{16}$

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

- ① $\frac{\pi}{12} + \frac{\sqrt{3}}{16}$ ② $\frac{\pi}{9} + \frac{\sqrt{3}}{12}$ ③ $\frac{\pi}{24} + \frac{\sqrt{3}}{32}$ ④ $\frac{\pi}{18} + \frac{\sqrt{3}}{24}$

[46] $x \cos 2x$ 의 매클로린 급수를 $\sum_{n=0}^{\infty} a_n x^n$ 라 하면 $\frac{a_3 + a_4}{a_5 + a_6}$ 의 값은?
(2.3점)

- ① -3 ② 2 ③ 5 ④ -6

[47] 극좌표계에서 곡선 $r = 1 + 2 \cos \theta$ 로 둘러싸인 영역 중 가장 작은 부분의 넓이는? (2.3점)

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

[48] 다음은 3차원 공간에서 점 $P(x_0, y_0, z_0)$ 와 평면 $\alpha: ax + by + cz + d = 0$ 사이의 거리를 계산하는 과정에 대한 설명이다. 이때, 실수 t 를 구하는 과정에서 필요한 식은? (2.3점)

점 P 에서 평면 α 에 내린 수선의 발을 $H(x_1, y_1, z_1)$ 이라 하자. 점 H 는 평면 α 위의 점이므로 다음 식이 성립한다.

$$ax_1 + by_1 + cz_1 + d = 0$$

평면 α 의 법선벡터 $\mathbf{n} = \langle a, b, c \rangle$ 는 벡터 \overrightarrow{HP} 와 평행하므로 $\overrightarrow{HP} = t\mathbf{n}$ 을 만족하는 실수 t 가 존재한다. 실수 t 를 구한 후 \overrightarrow{HP} 의 길이를 구하여 점 P 와 평면 α 사이의 거리를 구할 수 있다.

- ① $y_0 + y_1 + tb = 0$ ② $y_0 + y_1 - tb = 0$
③ $y_0 - y_1 + tb = 0$ ④ $y_0 - y_1 - tb = 0$

[49] 서로 다른 n 차원 열벡터 u_1, u_2, \dots, u_m 에 대한 설명 중 올바른 것을 모두 고른 것은? (2.3점)

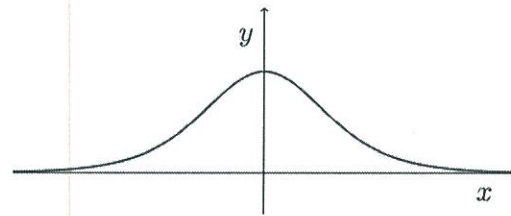
(가) $u_1^T u_2$ 는 행렬 $u_2 u_1^T$ 의 주대각원소의 합(trace)과 항상 같다.

(나) 행렬 $u_1 u_2^T$ 의 임의의 열벡터는 항상 다른 열벡터들의 선형 결합으로 표현할 수 있다.

(다) $m \geq n$ 이면, 행렬 $A = \sum_{i=1}^m u_i u_i^T$ 의 역행렬이 항상 존재한다.

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

[50] 그래프의 개형이 아래와 같은 함수를 해로 가질 수 있는 미분 방정식은? (아래 함수는 y 축 대칭이며 실수 전체에서 미분가능) (2.3점)



- ① $y^2(e^x + 1) = 5y' - 5y$ ② $-y^2 e^{-x} = 5y' + y$
③ $y^2(1 + e^{-x}) = y'$ ④ $y^2(1 + e^{-x}) = 5y' + 5y$

2022학년도 송실대학교 편입학

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※ 필답고사(수학) 문제풀이를 위하여 사용하는 연습지이오니 자유롭게 사용하시기 바라며 최종답안은 반드시 답안지에 작성할 것.

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