2023학년도 동국대학교 편입학모집
자연계열 필답고사 문제지

Ⓐ형　출제문항 : 영어 20문항, 수학 20문항 - 90분

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<영어>

■ [1-2] Choose the answer that has the closest meaning to the word underlined in each sentence below.

1. The president, whose approval rating has been sagging, expressed disappointment with the court's decision to block the administration's workplace vaccine mandate. [1점]
Ⓐ groundbreaking　　Ⓑ consisting　　Ⓒ preserving
Ⓓ rising　　　　　　Ⓔ sinking

2. The term "lunatic" derives from Latin *luna* ("moon"), the connection stemming from the belief that changes of the moon caused intermittent insanity. [1점]
Ⓐ aloof　　　　Ⓑ fastidious　　　Ⓒ deranged
Ⓓ snobbish　　Ⓔ vulnerable

■ [3-4] Identify the LEAST acceptable expression underlined in each passage below.

3. I Ⓐ call on business leaders to immediately join those Ⓑ whom have already stepped up - including Ⓒ one third of Fortune 100 companies - Ⓓ and institute vaccination requirements Ⓔ to protect their workers, customers, and communities. [1점]

4. Past mutations Ⓐ led to the emergence of omicron, which Ⓑ are less lethal than earlier versions Ⓒ but spreads very easily, as the dominant strain. But there is Ⓓ no guarantee that a future mutation Ⓔ might not cause more severe illness and deaths. [1점]

■ [5-8] Complete each passage with the best expression.

5. On the thirteenth day, Kasturbai knelt before a sacred plant and prayed; she had given him up for (　　　). His pulse was feeble and his skin cold. [2점]
Ⓐ frail　　　　　Ⓑ missing　　　　Ⓒ lost
Ⓓ provocative　　Ⓔ unconscious

6. Earlier this summer, several reports of thousand-bee swarms attacking people and animals made national news, often sounding more like scripts for horror films rather than real life. Unfortunately, while (　　　), attacks by aggressive species of stinging insects happen and when they do they can easily have deadly results. [2점]
Ⓐ certain　　　Ⓑ ominous　　　Ⓒ predictable
Ⓓ rare　　　　Ⓔ terrific

7. By sifting through data released by the Gaia spacecraft, astrophysicists discovered a black hole that's just over 1,560 light-years from Earth. Dubbed Gaia BH1, it's about twice as close as the previously nearest known black hole. But that record may not stand. About 100 million black holes are predicted to exist in the Milky Way. Since most are invisible, (　　　). But when Gaia, which is precisely mapping a billion stars, releases its next batch of data in a few years, even closer black holes may turn up. [2점]

Ⓐ it can't go there
Ⓑ they're hard to find
Ⓒ another spacecraft will be launched soon
Ⓓ a supercomputer can crack the mystery
Ⓔ any data about them won't be available in a near future

8. Artificial intelligence is opening up new possibilities for businesses and households, and now new text-to-image generators are giving everyone from artists to urban planners to reconstructive surgeons a new tool to help them visualize ideas. DALL·E 2 (named after artist Salvador Dali and Disney Pixar's WALL-E) is a new AI system that can create realistic images and art (   ). It looks at hundreds of millions of captioned images to turn text prompts written by users into images. Mark Chen, the lead researcher on DALL-E 2, told *The Atlantic* that image generators like DALL-E 2 aim to "democratize" art. [3점]

Ⓐ from natural ways of acting
Ⓑ for selected professional artists
Ⓒ for achieving better artistic qualities
Ⓓ instead of natural-language translation
Ⓔ from a description in natural language

◼ **[9-20] Read each passage below and answer the questions that follow.**

Bees pollinate important food crops, honeybees provide us with honey, and wasps kill large numbers of plant-feeding insects and (A) nuisance flies. Because of their many benefits, entomologists like those at Washington State University advise to "control them only if absolutely necessary." Remember that many bees and wasps are not aggressive and will only sting when handled or stepped on.
If you want to do something other than reach for a spray can of poison, you should first correctly identify the insect and determine whether it's a threat. Each species has different behaviors, and successful non-chemical techniques are tailored to the particular species. If you decide that the bees or wasps need to be removed, BE CAREFUL! These pests sting and can be dangerous ___(B)___ you are allergic to their venom.

9. The underlined word (A) nuisance means _____. [1점]
Ⓐ chaos   Ⓑ glimpse   Ⓒ nausea   Ⓓ trouble   Ⓔ vigor

10. Choose one that best fits into the underlined (B). [2점]
Ⓐ although   Ⓑ whether   Ⓒ so   Ⓓ that   Ⓔ if

11. According to the passage, which of the following is NOT true? [3점]
Ⓐ Wasps often do something good for people.
Ⓑ Insect scientists at Washington State University

advise us to be very cautious when controlling bees.
Ⓒ Many bees and wasps can be handled without any harm to people.
Ⓓ It's better for you to find successful non-chemical techniques when repelling bees and wasps.
Ⓔ Some people can be allergic to bee stings.

South Korea's first-ever lunar orbiter Danuri has sent black-and-white photos of the Moon's surface and Earth, the national space center said Tuesday. Danuri — a (A) portmanteau of the Korean words for "Moon" and "enjoy" — was launched on a SpaceX rocket from the United States in August 2022 and entered lunar orbit last month. Its images — taken between December 24 and January 1 — show the lunar surface and Earth, and were shot from less than 120 kilometers over the Moon, the Korea Aerospace Research Institute (KARI) said in a statement. The images and videos will be "used to select potential sites for a Moon landing in 2032," it added. Danuri is circling the Moon every two hours, the center said.
The orbiter will begin its scientific mission next month, which includes mapping and analyzing lunar terrain, and measuring magnetic strength and gamma rays. It will also test experimental "space internet" technology by ___(B)___ photos and videos to Earth. South Korea has laid out ambitious plans for outer space, including landing spacecraft on the Moon by 2032 and Mars by 2045.

12. The underlined word (A) portmanteau means _____. [2점]
Ⓐ blend   Ⓑ component   Ⓒ portable name generator
Ⓓ origin   Ⓔ symbol

13. Choose one that best fits into the underlined (B)? [2점]
Ⓐ transmitting   Ⓑ transcribing   Ⓒ transcending
Ⓓ transgressing   Ⓔ transforming

14. Which is true about Danuri? [3점]
Ⓐ It sent colorful photos of the Moon's surface and Earth,
Ⓑ It was launched from the United States in 2022.
Ⓒ Its name comes from English words.
Ⓓ It began its scientific mission last month,
Ⓔ Measuring the moon's gamma rays is not included in its mission.

More than half of the world's population lives in cities. With our lives increasingly lived in urban environments, it's vital for our personal well-being — and the planet's — that city planners find ways to foster a connection with nature. The evidence is clear — people need direct, personal experiences with nature to care enough to protect it. As evolutionary biologist Stephen Jay Gould argued, "We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well—for we will not fight to save what we do not love."

As urban populations continue to rise, the importance of reserving space for parks and nature in cities has become a necessary agenda.   (A)   being a dispensable luxury, green space is crucial for the health and well-being of both people and native species. Finding ways to foster personal experiences of green spaces, and the plants, animals, people and stories that provide meaning, is one way to increase city dwellers' emotional involvement with local nature. Such subjective bonds can (B) spur the motivation required for people's everyday actions to nurture and protect what they love.

15. Which is the best title of the passage above? [3점]
Ⓐ The importance of close relationship between humans and nature
Ⓑ The importance of reserving space for parks and homes in cities
Ⓒ Overpopulation problems in Metropolitan areas
Ⓓ The health and well-being of city dwellers
Ⓔ The history of urban expansion

16. Choose one that best fits into the underlined (A). [2점]
Ⓐ Instead of
Ⓑ In so far as
Ⓒ By means of
Ⓓ With regard to
Ⓔ However

17. The underlined word (B) spur means _____. [2점]
Ⓐ coax   Ⓑ hinder   Ⓒ incite   Ⓓ pour   Ⓔ deter

Never before have we had to fight for democracy and individual rights as now in this new and — in some sense — dark age of technology. It is impossible to imagine our present political polarization except in the age of the Internet, which drives people to sites of extreme views that validate their preexisting prejudices. And, in the spirit of Hollywood, it is impossible to imagine the degree and intensity of emotional and sensory manipulation, false rumors, exaggerations and character assassination that decay our public dialogue except in this new and terrifying age of technology which has only just begun.

Digital-video technology, precisely because it is given to manipulation, is inherently controlling. The Chinese, eventually with the help of big data, are working on following the Internet searches of their citizens, and then determining who needs to be singled out for further observation. If a government or a company knows the destination and sequence of all of your searches, it is virtually inside your mind. The possibilities are frightening, and the vistas for oppression unbounded. The digital age, originally sold to us as empowering, could yet become the greatest threat to free thought and democracy in history. The very idea of something (A) going viral is an expression of the mob more than of the individual. The fact that Google partially ranks search results in terms of how many other sites have linked to them reinforces groupthink, not individuality. The entire logic of the Web works toward popularity, not quality, and certainly not toward truth.

18. Which is the best title of the passage above? [3점]
Ⓐ Political polarization and the spirit of Hollywood
Ⓑ How to show up in Google's search results
Ⓒ Civic empowerment in the digital age
Ⓓ The advent of new and terrifying age of technology
Ⓔ Digital technology, the greatest threat to the authoritarian regimes

19. According to the passage above, which is true? [2점]
Ⓐ The age of the Internet has brought about political harmony.
Ⓑ Digital-video technology tends to manipulate people.
Ⓒ The Chinese government no longer monitors Internet access.
Ⓓ In today's Internet world, individuality is considered more important than groupthink.
Ⓔ The Web should work toward popularity, if not toward truth.

20. The underlined phrase (A) going viral means _____. [2점]
Ⓐ devastating   Ⓑ deteriorating   Ⓒ fabricating
Ⓓ trending   Ⓔ enforcing

< 수학 >

*문제풀이는 문제사이의 여백을 이용할 것.

1. 실수 a, b에 대하여 함수 $f(x) = \begin{cases} x^3 & (x \leq 1) \\ ax+b & (x > 1) \end{cases}$
가 $x = 1$에서 미분가능할 때, $a - b$의 값은? [2점]

　① 1　　② 2　　③ 3　　④ 4　　⑤ 5

2. $\lim\limits_{x \to \pi} \dfrac{\tan x - \sin x}{(x - \pi)\cos x}$ 의 값은? [2점]

　① -4　② -2　③ 0　④ 2　⑤ 4

3. 함수 $f(x)$가 $\lim\limits_{x \to 0^+} f(x) = 1$, $\lim\limits_{x \to 0^-} f(x) = -1$을
만족할 때 $\lim\limits_{x \to 0^+} f(x^2 - x) - \lim\limits_{x \to 0^-} f(|x|)$의 값은? [2점]

　① -2　② -1　③ 0　④ 1　⑤ 2

4. 좌표공간에서 네 점 $(0, 0, 0)$, $(1, 1, 1)$, $(-2, 2, 2)$, $(-3, 1, 4)$를 꼭짓점으로 갖는 사면체의 부피는? [2점]

　① 1　　② 2　　③ 3　　④ 4　　⑤ 5

5. 곡선 $y^3 + 8y = 6x^2$ 위의 점 $(2, 2)$에서의 접선을 l이라 할 때 직선 l의 y절편은? [2점]

① $-\dfrac{4}{5}$ ② $-\dfrac{2}{5}$ ③ 0 ④ $\dfrac{2}{5}$ ⑤ $\dfrac{4}{5}$

6. 행렬 $A = \begin{pmatrix} 1 & 0 & 1 & -3 \\ 2 & 1 & 7 & k-7 \\ 0 & 1 & 3 & 1 \\ 1 & -1 & 0 & -3 \end{pmatrix}$의 계수(rank)가 3일 때, 실수 k의 값은? [3점]

① 1 ② 2 ③ 3 ④ 4 ⑤ 5

7. 곡선 $y = \cosh x$와 직선 $y = 0$, $x = 0$ 및 $x = 3$으로 둘러싸인 영역을 x축으로 회전시킬 때 생기는 입체도형의 부피는? [3점]

① $\dfrac{\pi}{32}(e^6 - e^{-6}) + \dfrac{3\pi}{2}$ ② $\dfrac{\pi}{16}(e^6 - e^{-6}) + \dfrac{3\pi}{2}$

③ $\dfrac{\pi}{8}(e^6 - e^{-6}) + \dfrac{3\pi}{2}$ ④ $\dfrac{\pi}{4}(e^6 - e^{-6}) + \dfrac{3\pi}{2}$

⑤ $\dfrac{\pi}{2}(e^6 - e^{-6}) + \dfrac{3\pi}{2}$

8. 좌표평면 상에서 움직이는 두 입자 A, B가 시각 $t = 0$일 때 각각 원점과 $(-1, 0)$에 위치해 있다. 시각 $t > 0$일 때 A는 x축 위에서 x축의 양의 방향으로 일정한 속력 1로 움직이고, B는 직선 $y = -x - 1$ 위에서 x성분이 감소하는 방향으로 일정한 속력 $\sqrt{2}$로 움직인다. 시각 $t = 1$일 때 A와 B 사이의 거리의 변화율은? [3점]

① 2 ② $\sqrt{5}$ ③ $2\sqrt{2}$ ④ $\dfrac{3}{\sqrt{5}}$ ⑤ $\dfrac{7}{\sqrt{10}}$

9. 함수 $f(x) = (1-x^2)\ln x$ 에 대하여 $\dfrac{f^{(9)}(1)}{9!}$ 의 값은? [3점]

① $\dfrac{1}{28}$ ② $\dfrac{1}{14}$ ③ $\dfrac{3}{28}$ ④ $\dfrac{1}{7}$ ⑤ $\dfrac{5}{28}$

10. 좌표공간 내의 점 (x, y, z)에서 온도가 $T(x, y, z) = (x^2 + y^2)e^z$일 때, 점 $(1, -1, 0)$에서 온도가 가장 빨리 증가하는 방향의 벡터는? [3점]

① $\dfrac{1}{\sqrt{3}}(1, -1, 1)$ ② $\dfrac{1}{\sqrt{3}}(-1, 1, 1)$

③ $\dfrac{1}{\sqrt{3}}(1, 1, -1)$ ④ $\dfrac{1}{\sqrt{3}}(-1, 1, -1)$

⑤ $\dfrac{1}{\sqrt{3}}(1, -1, -1)$

11. 멱급수 $\displaystyle\sum_{n=1}^{\infty}\left(1 - \dfrac{3}{n}\right)^{n^2}(x-1)^n$의 수렴반지름은? [3점]

① e^{-3} ② e^{-1} ③ e ④ e^3 ⑤ e^5

12. 구간 $[0, \pi]$에서 정의된 함수 $f(x) = \cos x$의 역함수를 $g(x)$라고 하자. 함수 $h(x) = g(\sin x)$에 대하여 $h'(\dfrac{\pi}{6})$의 값은? [3점]

① $-\dfrac{\sqrt{3}}{2}$ ② -1 ③ 1 ④ 2 ⑤ $\dfrac{\sqrt{3}}{2}$

13. 극좌표로 표현된 곡선 $r = \sqrt{3 + \cos^2\theta}$ 의 내부의 넓이는? [3점]

① $\dfrac{\pi}{2}$ ② $\dfrac{3\pi}{2}$ ③ $\dfrac{5\pi}{2}$ ④ $\dfrac{7\pi}{2}$ ⑤ $\dfrac{9\pi}{2}$

14. 다음 보기 중 옳은 것은 모두 몇 개인가? [3점]

(가) $\displaystyle\lim_{(x,y)\to(0,0)} \dfrac{x^3}{x^2+y^2} = 0$

(나) $\displaystyle\lim_{(x,y)\to(0,0)} \dfrac{\sin(x^2+y^2)}{x^2+y^2} = 1$

(다) $\displaystyle\lim_{(x,y)\to(0,0)} \dfrac{x^2-y^2}{x^2+y^2} = 1$

(라) $\displaystyle\lim_{(x,y)\to(0,0)} \dfrac{\sqrt{2x^4+3y^5}}{x^2+y^2} = \sqrt{2}$

① 0개 ② 1개 ③ 2개 ④ 3개 ⑤ 4개

15. 함수 $f(x,y) = 3x^3 + 9x^2 + y^2 + 4y + 8$의 극값은? [3점]

① 1 ② 2 ③ 4 ④ 8 ⑤ 16

16. 행렬 A가 $A = \begin{pmatrix} 2 & 0 \\ 1 & 1 \end{pmatrix}$로 주어져 있을 때, 새로운 행렬 $I + A + A^2 + \cdots + A^{2023}$의 서로 다른 두 고유값(고유치, eigenvalue) 중에서 최댓값은? 단, $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$이다. [4점]

① 2023 ② 2024
③ 2025 ④ $2^{2024} - 1$
⑤ $2^{2025} - 1$

17. 구간 $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$에서 정의된 함수 $f(x) = \tan x$의 역함수를 $g(x)$라고 할 때, $\displaystyle\lim_{n\to\infty}\sum_{k=1}^{n} g\left(\dfrac{k}{n}\right)\dfrac{n}{n^2+k^2}$ 의 값은? [4점]

① $\dfrac{\pi^2}{32}$ ② $\dfrac{3\pi^2}{32}$ ③ $\dfrac{5\pi^2}{32}$ ④ $\dfrac{7\pi^2}{32}$ ⑤ $\dfrac{9\pi^2}{32}$

18. 적분 $\displaystyle\int_0^{\frac{\sqrt{3}}{2}} x(1-x^2)^{\frac{3}{2}}dx$ 의 값은? [4점]

① $\dfrac{1}{5}$ ② $\dfrac{31}{32}$ ③ $\dfrac{\sqrt{3}}{5}$ ④ $\dfrac{31\sqrt{3}}{32}$ ⑤ $\dfrac{31}{160}$

19. 영역
$$D = \{(x,y) : 0 \le x+y \le 1,\ 0 \le y-2x \le 1\}$$
에 대하여 $\displaystyle\iint_D \sqrt{x+y}\,(y-2x)^2\,dx\,dy$ 의 값은? [4점]

① $\dfrac{1}{27}$ ② $\dfrac{2}{27}$ ③ $\dfrac{4}{27}$ ④ $\dfrac{8}{27}$ ⑤ $\dfrac{16}{27}$

20. 단위원 $x^2 + y^2 = 1$을 반시계 방향으로 매개화한 곡선 C에 대하여 선적분
$$\oint_C (ye^{xy} - yx^2)dx + (xe^{xy} + xy^2)dy$$
의 값은? [4점]

① $-\dfrac{\pi}{3}$ ② $-\dfrac{\pi}{7}$ ③ $\dfrac{\pi}{5}$ ④ $\dfrac{\pi}{4}$ ⑤ $\dfrac{\pi}{2}$

[끝]