

단국대학교 2022학년도 편입생 모집 필기고사

고사시간	오후
과 목	영어, 수학

자연계열 문제지



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영어 [자연계열] < 오후 >

※ 밑줄 친 부분과 뜻이 가장 가까운 것을 고르시오. (1-8) [각3점]

1. The 15th letter of the Greek alphabet had been a fairly innocuous entity for 2,500 years. But in just two weeks, it became notorious with the spread of the Omicron variant.
① historic ② unfamiliar ③ dormant ④ harmless
2. Hooray for such a rare stand on principle, one that contrasts with the obsequious behavior of the sports organizations and businesses that have bowed to the authoritarian government.
① fawning ② cooperative ③ succumbing ④ apostatic
3. In the past, new immigrants were often able to obtain jobs easily. Now the advent of new technologies requires the newcomers to obtain more education to be recruited.
① outdated ② appearance ③ retrogression ④ retardation
4. The author's analysis and the scientific evidence validate the position that individuals do not need the same amount of leisure time to be satisfied.
① refute ② challenge ③ justify ④ neutralize
5. Under a scorching noonday sun in Toronto's Beaches neighborhood, Jason Remenda, 34, languidly pushes his 21-month-old son Jaydn on a swing.
① vigorously ② unenergetically
③ efficiently ④ expeditiously
6. He unequivocally accepted slavery and was blatantly ethnocentric when he taught his pupil to deal with foreigners in the same manner as animals or plants.
① tentatively ② discordantly ③ abnormally ④ explicitly
7. The economy is perennially one of voters' top issues, but very few of us fully grasp how specific economic indicators—such as the value of the dollar or the amount of the national debt—affect our everyday lives.
① largely ② particularly ③ supposedly ④ constantly

8. Last year, we would have been overjoyed to have the economic buoyancy we are seeing now.

- ① resilience ② breach ③ potential ④ depression

※ 어법상 빈칸에 가장 적절한 것을 고르시오. (9-11) [각3점]

9. From a corporate transaction point of view, the company is well-positioned, with profit lines _____ much higher than before.

- ① be ② are ③ being ④ were

10. A solid resumé objective will not only capture the attention of _____ is reading it but encourage him or her to keep reading.

- ① whoever ② whosever
③ whomever ④ whatever

11. The proliferation of regional institutions, their expanding functions _____ both traditional and transitional issues, and the growing incidence of inter-regionalism, may introduce a healthy diversity and leadership into the emerging world order.

- ① covered ② cover ③ covering ④ are covered

※ 밑줄 친 부분 중 어법에 맞지 않은 것을 고르시오. (12-14) [각3점]

12. Australia cannot ①single-handedly prevent climate change in ②the country's backyard. Instead, nations—③included those that ④aren't emitting that much on their own—must act collectively to embrace policies that reduce emissions.

13. ①In particular, I remember the ②constant growing tension ③between the widow of the deceased and the creditors who ④claimed that her late husband owed them money.

14. The amount of Earth's surface ①allocated to tropical rain forests has already been reduced to less than ②half of its original area, ③for until recent years the World Bank supported deforestation with loans to finance development schemes ④required clearing forests.

※ 다음 글을 읽고 물음에 답하십시오. (15-17) [각3점]

Oscar-winning actor Leonardo DiCaprio likes to say that he makes his living in made-up worlds. Now DiCaprio, a UN Messenger of Peace, has produced a documentary

chemical called dopamine in the brain's reward center. Dopamine helps transmit signals in the brain that make people feel happy. The number of brain receptors interacting with dopamine is higher in adolescence than at any other time of life. This means that when a teen is exposed to a reward—such as a compliment—the reward center reacts more strongly than it would for an adult or a child. You can begin to understand why the effects of peer pressure are much stronger among adolescents and teens.

18. According to the passage, which is NOT true?

- ① Dopamine is a major player in the brain's reward system.
- ② Adolescents are more sensitive to rewards than adults.
- ③ Adolescents are quite capable of making rational decisions.
- ④ Teenagers are often vulnerable to the effects of peer influence.

19. Which is the least likely function of the prefrontal cortex?

- ① Modifying emotions to fit socially accepted norms
- ② Recognizing future consequences of current actions
- ③ Choosing good and bad actions
- ④ Recognizing objects and processing visual information

※ 다음 글을 읽고 물음에 답하십시오. (20-21) [각3점]

The discovery that the universe is expanding was one of the great intellectual revolutions of the twentieth century. With hindsight, it is easy to wonder why no one had thought of it before. Newton, and others, should have realized that a static universe would soon start to contract under the influence of gravity. But suppose instead the universe is expanding. If it was expanding fairly slowly, the force of gravity would cause it eventually to stop expanding and then to start contracting. However, if it was expanding at more than a certain critical rate, gravity would never be strong enough to stop it, and the universe would continue to expand forever. This is a bit like what happens when one fires a rocket upward from the surface of the earth. If it has a fairly low speed, gravity will eventually stop the rocket, and it will start falling back. On the other hand, if the rocket has more than a certain critical speed (about seven miles per second) gravity will _____.

20. According to the passage, which is true?

- ① Newton assumed that the universe would contract due to the influence of gravity.
- ② Gravity can be a major force that influences the structure of the universe.
- ③ Before the twentieth century, researchers discovered that the universe was expanding.
- ④ Astronomers in the twentieth century persisted the belief in a static universe.

21. Which is the most appropriate for the blank?

- ① increase so it will fly to the space
- ② not be strong enough to pull it back
- ③ affect its direction of flying to the Earth
- ④ not be weak enough to lose control of it

※ 다음 글을 읽고 물음에 답하십시오. (22-23) [각3점]

William Shakespeare is widely regarded as the greatest English language playwright. He was a literary genius whose works are still read and performed all over the world. Shakespeare, the man, is something of an enigma, though, as very little is known about him. The lack of historical data has caused some literary experts to question whether William Shakespeare really wrote the works attributed to him. Skeptics cite a number of arguments to support their belief that Shakespeare, the playwright, was really someone else. First, fourteen plays have scenes that take place in Italy and demonstrate a detailed knowledge of Italian society and politics. However, there is no record of Shakespeare's ever traveling to Italy. Skeptics also argue that the level of vocabulary and language used in Shakespeare's works reflects the writings of a highly educated person with a good understanding of law, politics, and history. Yet there is no record of Shakespeare's ever attending a university.

Today, the majority of Shakespearean scholars believe that, in spite of his humble beginnings, the man from Stratford-upon-Avon was the true author of the literary greats. They argue that Shakespeare's lack of formal university education does not mean he could not have produced works of such genius.

22. Which is the most appropriate title for the passage?

- ① A Mysterious Bard, William Shakespeare
- ② The Great but His Identity Mistaken
- ③ Two Opposite Views on a Playwright
- ④ Sceptics Who Envy the Great English Dramatist

23. According to the passage, which is true?

- ① Scholars argue that many of Shakespeare's works were actually written by anonymous authors.
- ② Shakespeare wrote fourteen plays throughout his lifetime, which are on the stage now.
- ③ Shakespeare was never disciplined at a higher level of academic institution.
- ④ Shakespeare is regarded as a literary genius because of his lack of education.

※ 다음 글을 읽고 물음에 답하시오. (24-25) [각3점]

More than two-thirds of astronauts suffer from motion sickness while traveling in space. In the gravity-free environment, the body cannot distinguish up and down, which can result in nausea lasting as long as a few days. A body that is deprived of gravity also experiences changes in the distribution of bodily fluids. More fluid than normal ends up in the face, neck, and chest, resulting in a puffy face, bulging neck veins, and a slightly enlarged heart.

Throughout the duration of a mission, astronauts' bodies experience some potentially dangerous disorders. One of the most common is loss of muscle mass and bone density. Another effect of the weightless environment is that astronauts tend not to use their legs as much, so the muscles gradually atrophy. Exposure to radiation is another serious hazard that astronauts face. Without the earth's atmosphere to protect them, astronauts can be exposed to intense radiation from the sun and other galactic bodies, leaving them at risk of cancer.

In addition to physiological difficulties, astronauts who travel for extended periods may also suffer from psychological stress. Astronauts live and work in small, tight spaces, and they must be able to deal both physically and mentally with the confined environment. Long period away from family and friends can leave space travelers feeling lonely and depressed.

24. Which is the topic of the passage?

- ① Positive and negative effects of a long-term space travel
- ② Astronauts having physical as well as mental disorders
- ③ What effects space travel has on human mind and body
- ④ What conditions are like beyond Earth's atmosphere

25. Which is different in meaning from the other three?

- ① gravity-free
- ② deprived of gravity
- ③ weightless
- ④ confined

※ 다음 글을 읽고 물음에 답하십시오. (26-27) [각5점]

The effectiveness of an argument often depends on the background of the writer. For example, if you are a nuclear physicist, you may be able to convince your readers of the dangers of nuclear power. If you are a local merchant who is worried about a new power plant in the community, you will have to take extra measures to convince your audience. _____ (A) _____ a merchant probably doesn't have expertise or any experience in nuclear physics, he or she needs to show the readers that he or she is knowledgeable. To do this, the merchant can quote experts and/or show that he or she has read widely about the subject by referring to information gotten from books and articles.

The most effective persuasion uses words that are neither too strong nor too weak to explain the situation. If you are trying to convince your readers not to support a certain political candidate, you will probably use strong language that warns of the consequences of voting for that candidate. _____ (B) _____, if you are advertising a new toy, you probably won't try to convince your readers that their lives will be ruined if they don't buy the toy for their children.

26. Which is the topic of the passage?

- ① How to persuade effectively
- ② How to make a good address
- ③ How to show one's knowledge without offensiveness
- ④ How to verify the market testing

27. Which is the most appropriate for the blanks (A) and (B)?

- ① When — Therefore
- ② Since — On the other hand
- ③ As — Consequently
- ④ Because — For example

※ 다음 글을 읽고 물음에 답하십시오. (28-30) [각5점]

Of what materials is the earth composed, and in what manner are these materials arranged? These are the first inquiries with which Geology is occupied, a science which derives its name from the Greek *ge*, the earth, and *logos*, a discourse. Previously to experience we might have imagined that investigations of this kind would relate exclusively to the mineral kingdom, and to the various rocks, soils, and metals, which occur upon the surface of the earth, or at various depths beneath it. But, in pursuing such researches, we soon find ourselves led on to consider the successive changes which

have taken place in the former state of the earth's surface and interior, and the causes which have given rise to these changes; and what is still more singular and unexpected, we soon become engaged in researches into the history of the animate creation, or of the various tribes of animals and plants which have, at different periods of the past, inhabited the globe.

All are aware that the solid parts of the earth consist of distinct substances, such as clay, chalk, sand, limestone, coal, slate, granite, and the like; but previously to observation it is commonly imagined that all these had remained from the first in the state in which we now see them—that they were created in their present form, and in their present position. The geologist soon comes to a different conclusion, discovering proofs that the external parts of the earth were not all produced in the beginning of things in the state in which we now behold them, nor in an instant of time. On the contrary, he can show that they have acquired their actual configuration and condition gradually, under a great variety of circumstances, and at successive periods, during each of which distinct races of living beings have flourished on the land and in the waters, the remains of these creatures still lying buried in the crust of the earth.

28. Which of the following modes of writing is included in the first paragraph?
① criticism ② narration ③ classification ④ definition
29. Which is the closest in meaning to the underlined part?
① channel ② trajectory ③ mutation ④ shape
30. According to the passage, which is true?
① Although geology was first thought to be a study of earth changes, further study shows that the history of animals and plants are part of the subject as well.
② Although geology was first thought to be a study of minerals, further study shows that animals and plants are part of the subject as well.
③ Although geology was first thought to be a study of the earth's surface, further study shows that the depths beneath the surface are part of the subject as well.
④ Although geology was first thought to be a study of the history of creation, further study shows that animals and plants are part of the subject as well.

수학 [자연계열] <오후> [문항별 5점]

31. $\lim_{\theta \rightarrow 0} \left(\frac{\cot 2\theta}{\csc \theta} - \frac{\sin(\cos \theta)}{\sec \theta} \right)$ 의 값은?

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

32. 구간 $[-4, 1]$ 에서 함수 $f(x) = -xe^{-x^2/8}$ 의 최솟값과 최댓값의 합은?

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

33. 곡선 $y^2 = x$ 와 직선 $x = 2y$ 로 둘러싸인 영역을 y 축을 중심으로 회전시켜 얻은 입체의 부피는?

- ① $\frac{11}{3}\pi$ ② $\frac{58}{15}\pi$ ③ $\frac{61}{15}\pi$ ④ $\frac{64}{15}\pi$

34. 다음 중 수렴하는 급수의 개수는?

$\neg.$ $\sum_{n=1}^{\infty} \frac{n^2 + 2n}{\sqrt{3+n^5}}$	$\iota.$ $\sum_{n=1}^{\infty} \frac{n^n}{n!}$
$\updownarrow.$ $\sum_{n=1}^{\infty} \frac{(-1)^n 2n}{3n-1}$	$\kappa.$ $\sum_{n=1}^{\infty} \frac{\ln \sqrt{n}}{n}$
$\mu.$ $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2+n}}$	

- ① 0 ② 1 ③ 2 ④ 3

35. 다음 중 수렴하는 특이적분의 개수는?

$\neg.$ $\int_1^{\infty} \frac{\ln x}{x} dx$	$\iota.$ $\int_0^2 x^2 \ln x dx$
$\updownarrow.$ $\int_0^{\infty} e^{-x^2} dx$	$\kappa.$ $\int_0^{\infty} \frac{x}{1+x^2} dx$

- ① 0 ② 1 ③ 2 ④ 3

36. 구간 $[0, 2\pi]$ 에서 극 곡선 $r = e^{a\theta}$ 의 길이가 $3(e^{2a\pi} - 1)$ 일 때, 양의 실수 a 의 값은?

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

37. 함수 $f(x, y) = \sin x + e^{2xy}$ 에 대하여 점 (a, b) 에서의 물매(gradient)가 $\nabla f(a, b) = \langle 3, 0 \rangle$ 일 때, $a+b$ 의 값은? (단, a, b 는 상수이다.)

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

38. 영역

$$E = \{(x, y, z) \mid 0 \leq x \leq 1, 0 \leq z \leq x, x \leq y \leq 2x\}$$

에 대하여 삼중적분

$$\iiint_E yz \cos(x^5) dV = a \sin 1$$

일 때, 양의 실수 a 의 값은?

- ① $\frac{7}{10}$ ② $\frac{3}{10}$ ③ $\frac{7}{20}$ ④ $\frac{3}{20}$

39. 집합 $\{(x, y) \mid x^2 + y^2 = r^2\}$ 에서 함수 $f(x, y) = x^2 + 2y^2$ 의 최솟값과 최댓값의 합이 12일 때, 양의 실수 r 의 값은?

- ① 1 ② $\sqrt{2}$ ③ 2 ④ 4

40. 네 곡선 $y = \sqrt{x}, y = \sqrt{x} + 2, y = 4 - \sqrt{x}, y = 6 - \sqrt{x}$ 으로 둘러싸인 영역을 D 라 할 때, 이중적분 $\iint_D \frac{1}{2\sqrt{x}} e^{y-\sqrt{x}} dA$ 의 값은?

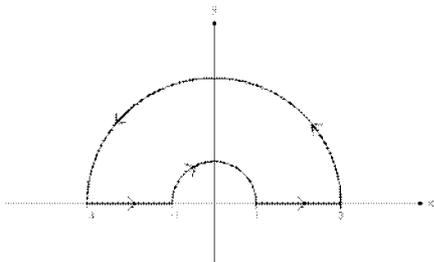
- ① $e-1$ ② e ③ e^2 ④ e^2-1

41. 아래 그림과 같이 곡선 C 는

영역 $\{(x, y) \mid 1 \leq x^2 + y^2 \leq 9, y \geq 0\}$ 의 경계일 때,

벡터장 $\vec{F}(x, y) = \langle y^2, 3xy \rangle$ 에 대하여

선적분 $\int_C \vec{F} \cdot d\vec{r}$ 의 값은?



- ① $\frac{52}{3}$ ② $\frac{53}{3}$ ③ 18 ④ $\frac{55}{3}$

42. 곡선 C 는 아래와 같이 점 $(-1, 0, 0)$ 부터 점 $(0, 1, 1)$ 까지 C_1, C_2, C_3 으로 이루어져 있다.

- 점 $(-1, 0, 0)$ 에서 점 $(1, 0, 0)$ 까지의 선분 C_1
- 점 $(1, 0, 0)$ 에서 점 $(1, 1, 1)$ 까지의 곡면 $z = y^2$ 위의 곡선 C_2
- 점 $(1, 1, 1)$ 에서 점 $(0, 1, 1)$ 까지의 선분 C_3

벡터장

$$\vec{F}(x, y, z) = \langle y^2, 2xy + z \cos(yz) + e^z, y \cos(yz) + ye^z \rangle$$

에 대하여 선적분 $\int_C \vec{F} \cdot d\vec{r}$ 의 값은?

- ① $\sin 1 + e$ ② $\sin 1 - 1$
 ③ $\cos 1 + e$ ④ $\cos 1 - 1$

43. 곡면 S 는 원기둥 $x^2 + y^2 = 1$ 을

두 평면 $z = 0$ 과 $x - z + 1 = 0$ 으로 자르고 남은

원기둥이다. 벡터장 $\vec{F}(x, y, z) = \langle 0, 0, z \rangle$ 에 대하여,

면적분 $\iint_S \vec{F} \cdot d\vec{S} = a\pi$ 일 때, 상수 a 의 값은?

(단, 곡면 S 의 방향은 원점에서 바라봤을 때 바깥 방향이다.)

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

44. 3차원 공간에서 네 점

$P(-2, 1, 0), Q(-2, 3, 2), R(2, 4, -2), S(3, 6, 1)$ 을 꼭짓점으로 하는 사면체 PQRS의 길넓이는?

- ① $\sqrt{56} + \sqrt{67} + \sqrt{104} + \frac{1}{2}\sqrt{394}$
 ② $\sqrt{56} + \sqrt{66} + \frac{1}{2}\sqrt{426} + \frac{1}{2}\sqrt{390}$
 ③ $\sqrt{57} + \sqrt{67} + \sqrt{104} + \frac{1}{2}\sqrt{394}$
 ④ $\sqrt{57} + \sqrt{66} + \frac{1}{2}\sqrt{426} + \frac{1}{2}\sqrt{390}$

45. 행렬 $A = \begin{pmatrix} 2 & 3 & 2 \\ 1 & 3 & 1 \\ 1 & 2 & -1 \end{pmatrix}$ 의 수반행렬(adjoint matrix)을

B 라 할 때, $\text{tr}(AB)$ 의 값은?

(단, $\text{tr}(A)$ 는 행렬 A 의 트레이스(trace)이다.)

- ① -6 ② -12 ③ -18 ④ -24

46. 선형변환 $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ 가 각 점을

양의 y 축을 중심으로 $\pi/3$ 만큼 시계 반대 방향으로 회전시키고, 그 점을 양의 z 축을 중심으로 $\pi/6$ 만큼 시계 반대 방향으로 회전시키는 변환일 때, 변환 T 에 대한 표준행렬은?

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

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

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

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

47. 연립일차방정식

$$\begin{cases} x_1 + 3x_2 - 2x_3 + 2x_5 = 0 \\ 2x_1 + 6x_2 - 5x_3 - 2x_4 + 4x_5 - 3x_6 = 0 \\ x_3 + 2x_4 + 3x_6 = 0 \\ x_1 + 3x_2 + 4x_4 + 2x_5 + 9x_6 = 0 \end{cases}$$

의 해공간의 차원(dimension)은?

- ① 2 ② 3 ③ 4 ④ 5

48. $y = y(x)$ 가 미분방정식

$$ydx - 3x^{2/3}(x^{2/3} + 1)dy = 0, \quad y(1) = 1$$

의 해일 때 $y(3\sqrt{3})$ 의 값은?

- ① $e^{\pi/3}$ ② $e^{\pi/12}$
 ③ $e^{-\pi/3}$ ④ $e^{1-\pi/12}$

49. $y = y(x)$ 가 미분방정식

$$x^2y'' + xy' + 4y = 2x \ln x,$$

$$y(1) = 0, \quad y(e^{3\pi/4}) = \frac{3\pi}{10}e^{3\pi/4}$$

의 해일 때, $y(e)$ 의 값은?

- ① $\frac{4}{25}\cos 2 + \frac{4}{25}e^{3\pi/4}\sin 2 - \frac{6}{25}e$
 ② $\frac{4}{25}\cos 2 - \frac{4}{25}e^{3\pi/4}\sin 2 - \frac{6}{25}e$
 ③ $\frac{4}{25}\cos 2 + \frac{4}{25}e^{3\pi/4}\sin 2 + \frac{6}{25}e$
 ④ $\frac{4}{25}\cos 2 - \frac{4}{25}e^{3\pi/4}\sin 2 + \frac{6}{25}e$

50. $X = X(t)$ 가 연립미분방정식

$$X'(t) = \begin{pmatrix} 3 & -18 \\ 2 & -9 \end{pmatrix} X(t), \quad X(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

의 해일 때, $X(1)$ 을 구하면?

- ① $\begin{pmatrix} -11e^{-3} \\ -3e^{-3} \end{pmatrix}$ ② $\begin{pmatrix} 11e^{-3} \\ -3e^{-3} \end{pmatrix}$
 ③ $\begin{pmatrix} -11e^{-3} \\ 3e^{-3} \end{pmatrix}$ ④ $\begin{pmatrix} 11e^{-3} \\ 3e^{-3} \end{pmatrix}$

영어 정답표 [자연계열] < 오후 >

문제번호	1	2	3	4	5	6	7	8	9	10
정답	④	①	②	③	②	④	④	①	③	①
배점	3	3	3	3	3	3	3	3	3	3

문제번호	11	12	13	14	15	16	17	18	19	20
정답	③	③	②	④	①	①	②	③	④	②
배점	3	3	3	3	3	3	3	3	3	3

문제번호	21	22	23	24	25	26	27	28	29	30
정답	②	①	③	③	④	①	②	④	④	②
배점	3	3	3	3	3	5	5	5	5	5

수학 정답표 [자연계열] < 오후 >

문제번호	31	32	33	34	35	36	37	38	39	40
정답	③	②	④	①	③	②	②	④	③	④
배점	5	5	5	5	5	5	5	5	5	5

문제번호	41	42	43	44	45	46	47	48	49	50
정답	①	①	③	④	③	④	②	②	④	①
배점	5	5	5	5	5	5	5	5	5	5