

단국대학교 2019학년도 편입생 모집 필기고사

자연계열 문제지

(A형)



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영어 [자연계열] ㉠ 형

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

1. *New Yorker* short stories often include esoteric allusions to obscure people and events.
① querulous ② acerbic ③ recondite ④ inverse
2. Her growing bitterness was exacerbated by her professional rivalry with her sister, whose fortunes rose while her own declined.
① venerated ② emulated ③ halted ④ exasperated
3. Wendy's negotiations with an unfamiliar and often threatening world should be excruciating to watch.
① pestersome ② abstruse ③ denunciatory ④ dilatory
4. Military advisors were upbraided for presenting global reductions in nuclear stockpiles as progress.
① alienated ② reprimanded ③ overawed ④ scavenged
5. People expected Winston Churchill to take his painting lightly, but Churchill, no dilettante, regarded his artistic efforts most serious indeed.
① zealot ② altruist ③ tyro ④ renegade
6. The President's job is to abrogate any law that fosters inequality among citizens.
① resolve ② pass ③ observe ④ repeal
7. Kristin's dedication to her job is laudable, but she doesn't have the necessary skills to be a good executive officer.
① laughable ② commendable ③ regrettable ④ dependable
8. Mandy's performance on the Math test was hampered because her attention was focused on the party she was attending on that weekend.
① intensified ② endowed ③ obstructed ④ occupied

High performance textiles are basically functional textiles that provide added value to the textiles in addition to common attributes of clothing materials. The functionality is achieved due to the starting material, i.e., fibers, structural aspects and finishing imparted to the final product.

This tutorial will focus on the first pillar, which is the raw material for advanced textile products. The seminar is aimed at beginners in this field as well as those who have the basic understanding of textiles and industrial textiles in particular. Subject areas covered will include: an outline of high performance textiles, classification of fibers, fibers that provide different functionality, functionality provided by 3-dimensional and structural fibers such as bi-component, sustainability aspects, micro and nano structural fibers, and what's next?

The tutorial is not included with the conference registration. A discounted tutorial registration fee will be available to individuals attending the conference.

15. Who is most likely to have interest in this information?

- ① accountants of clothing companies ② researchers in fiber materials
- ③ laborers working at energy plants ④ teachers engaging in kindergartens

16. According to the passage, which is true?

- ① The tutorial will take place after the conference.
- ② For tutorial registration, conference participants will be charged less than the regular fee.
- ③ The pre-conference event will be held for two days.
- ④ People cannot take part in both the tutorial event and the conference presentations.

※ 다음 글을 읽고 물음에 답하십시오. (17-18) [각3점]

A surgical technique known as 'keyhole surgery' has become more common in recent years. This technique eliminates the need for surgeons to make large incisions. _____, a couple of small incisions, each measuring about one centimeter, are made around the area to be operated on. Long instruments, which look a bit like chopsticks, are inserted through the tiny incisions and into the patient's body. At the end of these instruments are small tools that resemble standard surgical tools. A tiny camera, called an endoscope, is also inserted into the body through one of the incisions. The camera relays an image of what is happening inside the patient's body to a large computer monitor, so doctors are able to see what is going on, and where to place the tools. The awkward part of the

keyhole surgery is that it is counterintuitive; if a surgeon wants to move the tool to the left, he or she must push it to the right, and vice versa.

17. Which is the most appropriate for the blank?

- ① Instead ② However
③ Likewise ④ In particular

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

- ① It requires the use of long, thin tools and a small camera.
- ② A doctor views the inside of a patient's body on a computer screen.
- ③ It would leave rather smaller scars.
- ④ It needs long chopsticks to be inserted through the incisions.

※ 다음 글을 읽고 물음에 답하시오. (19-21) [각3점]

Genus *Homo*'s position in the food chain was, until recently, solidly in the middle. For millions of years, humans hunted smaller creatures and gathered what they could, all the while being hunted by larger predators. It was only 400,000 years ago that several species of man began to hunt large game on a regular basis, and only in the last 100,000 years—with the rise of *Homo sapiens*—that man jumped to the top of the food chain.

That spectacular leap from the middle to the top had enormous consequences. Other animals at the top of the pyramid, such as lions and sharks, evolved into that position very gradually, over millions of years. This enabled the ecosystem to develop _____ that prevent lions and sharks from wreaking too much havoc. As lions became deadlier, so gazelles evolved to run faster, hyenas to cooperate better, and rhinoceroses to be more bad-tempered. In contrast, humankind ascended to the top so quickly that the ecosystem was not given enough time to adjust. Moreover, humans themselves failed to adjust. Most top predators of the planet are majestic creatures. Millions of years of domination have filled them with confidence. Sapiens by contrast is more like a banana-republic dictator.

19. Which is the most appropriate for the blank?

- ① disposition and reproduction ② competition and coexistence
③ checks and balances ④ privilege and regulation

20. According to the passage, which best explains the underlined part?

- ① Sapiens first evolved from the apes, being dependent on staple food crops, bananas.
- ② Homo sapiens accomplished immense power based on unique political structures.
- ③ Humans are anxious about their position, which makes them brutal and dangerous.
- ④ Humankind accomplished agricultural revolution to make the original affluent society.

21. According to the passage, which is true?

- ① Homo sapiens subsisted by domesticating animals and plants 400,000 years ago.
- ② Lions and sharks are in the middle of food chain for millions of years.
- ③ Most top predators destroyed the ecosystem by hunting other animals.
- ④ The ecosystem changed as predators evolved to be more powerful.

※ 다음 글을 읽고 물음에 답하시오. (22-23) [각3점]

There are several different ways to measure the prevalence of overweight in the population. The National Center for Health Statistics (NCHS) uses body mass index (BMI) to determine if a person is overweight. BMI is a ratio of height to weight. “Overweight” means about 124 percent of desirable weight for men and 120 percent for women, after adjustments for clothing and shoes. Since obesity is defined as having a body weight at least 20 percent greater than desirable, BMI captures only obese children and adults.

People who could stand to lose a pound or two, and even some who should probably shed 10 or 20, are not counted as overweight using this measure. The standard height/weight tables produced by the Metropolitan Life Insurance Company aren’t so forgiving. When you ask U.S. adults their height and weight, and determine their overweight status based on the tables, the share who exceed their desirable body weight jumps to almost seven (A)_____ ten in 1995. This is how *Prevention* magazine measured overweight for the 13 years it conducted the *Prevention* index survey of Americans’ health. *Prevention* said that the share of adults who are overweight by its definition increased from 58 percent in 1983 to 68 percent in 1995.

Many researchers believe BMI is the best way to determine overweight precisely because it captures the population most (B)_____ risk of overweight-related health problems. In addition, the way BMI is determined by the NCHS makes it more reliable than self-reported data on weight. The temptation to understate your weight by a pound or ten is natural, and the tendency to underreport one’s weight increases with extra pounds.

22. Which are suitable for blanks (A) and (B)?

- ① in-at ② by-to
③ among-to ④ at-in

23. According to the passage, which is true?

- ① Not all people without desirable weights are classified as overweight by BMI.
- ② Overweight people usually weigh more than obese people.
- ③ People in general overreport their weight in the answer to the survey.
- ④ Health experts do not prefer BMI to other methods of defining overweight.

※ 다음 글을 읽고 물음에 답하시오. (24-25) [각3점]

The scientific consensus on global warming comes from the Intergovernmental Panel on Climate Change (IPCC). It was established in 1988 by the World Meteorological Organization and the United Nations Environment Program to assess the science of climate change, determine its impacts on the environment and society, and formulate strategies to respond. More than 900 scientists from 40 countries have participated as authors or expert reviewers in the IPCC's latest report, published in 1995.

“It’s a look at the state of the art—what we know about the climate system,” says Gerald Meehl of the National Center for Atmospheric Research, a lead author for one of the report’s chapters. “Literally thousands of people wind up reading these things.... It’s the consensus view of just about everyone who’s chosen to become involved.” In June, some 2,400 scientists signed a letter saying they _____ the findings.

The basics of global warming are simple. So-called greenhouse gases—including carbon dioxide and methane—build up in the atmosphere. Carbon dioxide is the most important of the greenhouse gases generated by human activity. The gases trap the sun’s heat, like a car parked in the sun with the windows closed. Couple that with a basic fact: The amount of carbon dioxide in the atmosphere has risen by 30% since pre-industrial times (about 1750). The implication is that temperatures are rising, and that’s what the IPCC was charged with studying.

24. Which is the topic of the passage?

- ① Scientific and social consensus of global warming
- ② The causes and results of global warming
- ③ IPCC's report and the basics of global warming
- ④ The political view of IPCC on global warming

※ 다음 글을 읽고 물음에 답하시오. (29-30) [각5점]

Democracy has another merit. It allows criticism, and if there isn't public criticism there are bound to be hushed-up scandals. That is why I believe in the press, despite all its lies and vulgarity, and why I believe in Parliament. The British Parliament is often sneered at because it's a talking shop. Well, I believe in it because it is a talking shop. I believe in the private member who makes himself nuisance. He gets snubbed and is told that he is cranky or ill-formed, but he exposes abuses which would otherwise never have been mentioned, and very often an abuse gets put right just by being mentioned. Occasionally, too, in my country, a well-meaning public official loses his head in the cause of efficiency, and thinks himself God Almighty. Such officials are particularly frequent in the Home Office. Well, there will be questions about them in Parliament sooner or later, and then they'll have to mend their steps. Whether Parliament is either a representative body or an efficient one is very doubtful, but I value it because it criticizes and talks, and because its chatter get widely reported. So two cheers for democracy: one because it admits variety and two because it permits criticism. Two cheers are quite enough: there is no occasion to give three.

29. Which has the closest meaning to the underlined part?

- ① A space for diplomatic meetings
- ② A place for genuine and serious discussion
- ③ A space for healthy arguments
- ④ A noisy and boisterous place

30. According to the passage, which is true?

- ① One of the merits of democracy is to expose abuses.
- ② Too much talk interrupts the efficiency of a system.
- ③ Criticism is the only important ingredient of democracy.
- ④ Democracy should be based on the consideration of the others.

수학 [자연계열] ①형 [문항별 5점]

31. 곡선 $y = \tan\left(\frac{\pi x^2}{4}\right)$ 위의 점 $(1, 1)$ 에서의 접선의 y 절편은?

- ① $-\pi - 1$ ② $-\pi$ ③ $-\pi + 1$ ④ $-\pi + 2$

32. 다음의 설명 중 옳은 것의 개수는? (단, $[x]$ 는 x 보다 크지 않은 최대의 정수이다.)

- ㄱ. 직선 $y = 2x + 3$ 은 곡선 $2x^3 - x^2y + 3x^2 - x + y = 5$ 의 경사점근선(oblique asymptote)이다.
 ㄴ. 함수 f 와 g 가 연속함수가 아니면 $f+g$ 또는 fg 는 연속함수가 아니다.
 ㄷ. $f(x) = -x^2 + x$, $g(x) = x - [x]$ 에 대하여 $(f \circ g)(x)$ 는 연속함수이다.
 ㄹ. 함수 $f(x) = 3x - 2\cos x + 1$ 에 대하여, $(f^{-1})'(-1) = \frac{1}{3}$ 이다.

- ① 1개 ② 2개 ③ 3개 ④ 4개

33. $\int_1^e (\ln x)^2 dx$ 의 값은?

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

34. 두 실수 a, k 가

$$a = \int_0^\infty \left(\frac{1}{\sqrt{x^2 + 4}} - \frac{k}{x + 2} \right) dx$$

를 만족시킬 때, $a \times k$ 의 값은?

- ① $\ln 2$ ② $\ln 3$ ③ $2\ln 2$ ④ $\ln 5$

35. 멱급수 $\sum_{n=1}^\infty \frac{n^n (x-2)^n}{3 \times 7 \times 11 \times \cdots \times (4n-1)}$ 이 수렴하게 되는 모든 정수 x 의 값의 합은?

- ① 6 ② 10 ③ 15 ④ 21

36. 심장선 $r = 1 + \sin \theta$ 로 둘러싸인 영역의 넓이는?

- ① $\frac{11\pi}{8}$ ② $\frac{3\pi}{2}$ ③ $\frac{13\pi}{8}$ ④ $\frac{7\pi}{4}$

37. 세 점 $P_1(2, 1, -1)$, $P_2(-1, 3, 0)$, $P_3(3, 2, -5)$ 는 평면 α 위에 있고, 점 $A(-2, 2, -6)$ 을 지나고 벡터 $\mathbf{u} = \langle 1, 1, -2 \rangle$ 에 평행한 직선이 평면 α 와 만나는 점을 B 라 하자. 두 벡터 \overrightarrow{BA} 와 $\overrightarrow{BP_2}$ 사이의 각을 θ 라 할 때, $\cos \theta$ 의 값은?

- ① $-\frac{5}{9}\sqrt{3}$ ② $-\frac{2}{9}\sqrt{3}$
 ③ $\frac{2}{9}\sqrt{3}$ ④ $\frac{5}{9}\sqrt{3}$

38. 점 $(2, 1, \pi)$ 에서 함수 $f(x, y, z) = y^2 + x \cos(yz)$ 의
벡터 $\mathbf{v} = \langle 2, 3, -6 \rangle$ 방향으로의 방향도함수는?

① $-\frac{6}{7}$ ② $-\frac{3}{7}$ ③ $\frac{2}{7}$ ④ $\frac{4}{7}$

39. 이변수함수 $f(x, y) = x^4 + y^4 - 4xy + a$ 의 모든 극값의
합이 -2 일 때, 실수 a 의 값은?

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

40. 두 포물선 $y^2 = 1 - x$, $y^2 = 1 + x$ 로 둘러싸인 부분 중
에서 $y \geq 0$ 인 영역을 R 이라 할 때, 이중적분

$$\iint_R y \, dA \text{의 값은?}$$

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

41. 양의 실수 a 에 대하여

$$B(a) = \{(x, y, z) | x^2 + y^2 + z^2 \leq a^2\} \text{일 때 삼중적분}$$

$$\iiint_{B(a)} \left(\frac{2}{x^2 + y^2 + z^2} - \frac{2}{\sqrt{x^2 + y^2 + z^2}} \right) dV$$

의 최댓값은?

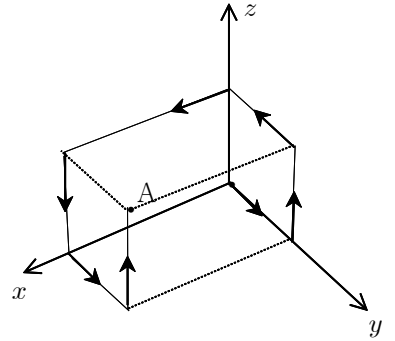
① π ② 2π ③ 3π ④ 4π

42. 그림과 같이 C 는 원점 $O(0, 0, 0)$ 부터 점 $A(2, 1, 1)$ 까지
직육면체의 변을 따라 움직이는 경로이고, 벡터장

$$\mathbf{F}(x, y, z) = \langle e^y, xe^y - e^z, -ye^z \rangle \text{일 때, 선적분}$$

$$\int_C \mathbf{F} \cdot d\mathbf{r} \text{의 값은?}$$

① e ② $2e$
③ $3e$ ④ $4e$



43. 원기둥 $x^2 + y^2 = 1$ 과 평행한 두 평면 $z = 1 + 2x$,
 $z = 2 + 2x$ 로 둘러싸인 입체의 경계를 S 라 하자.

$$\text{벡터장 } \mathbf{F}(x, y, z) = \langle x^2 + 3y, -3y^2 + \sin z, 2z^2 \rangle \text{에}$$

대하여 면적분 $\iint_S \mathbf{F} \cdot d\mathbf{S}$ 의 값은? (단, S 의 방향은
둘러싸인 영역의 바깥 방향이다.)

① 2π ② 4π ③ 6π ④ 8π

44. 벡터장 $\mathbf{r}(x, y, z) = \langle x, y, z \rangle$ 에 대하여 $r = |\mathbf{r}|$ 이라
할 때, 다음 중 옳은 것의 개수는? (단, $\mathbf{r} \neq \mathbf{0}$ 이다.)

$$\neg. \operatorname{curl} \mathbf{r} = \mathbf{0}$$

$$\neg. \operatorname{div} \mathbf{r} = 3$$

$$\neg. \operatorname{div} (r\mathbf{r}) = 4r$$

$$\neg. \operatorname{curl} (\nabla r) = \mathbf{0}$$

① 1개 ② 2개 ③ 3개 ④ 4개

45. 행렬 $\begin{pmatrix} 1 & 4 \\ 1 & a \end{pmatrix}$ 의 모든 고윳값의 합이 -1 일 때, 실수 a 의 값은?

- ① -4 ② -3 ③ -2 ④ -1

46. 선형변환 $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ 는

$\mathbf{v}_1 = (1, 1, 1)$, $\mathbf{v}_2 = (1, 1, 0)$, $\mathbf{v}_3 = (1, 0, 0)$ 에 대하여

$T(\mathbf{v}_1) = (1, 0)$, $T(\mathbf{v}_2) = (2, 1)$, $T(\mathbf{v}_3) = (4, 3)$

일 때, $T(2, 4, -2)$ 가 나타내는 벡터는?

- ① $(-2, 0)$ ② $(0, -2)$
③ $(2, 0)$ ④ $(0, 2)$

47. 행렬 $A = \begin{pmatrix} 1 & a & -2 \\ 0 & -1 & 2 \\ -1 & 1 & 0 \end{pmatrix}$ 와 $B = \begin{pmatrix} 1 & 0 & -1 \\ 0 & b & 1 \\ 1 & 0 & 0 \end{pmatrix}$ 에

대하여 $\det(AB) = \det(A+B)$ 가 성립할 때,

ab 의 값은? (단, a, b 는 실수이다.)

- ① -6 ② -3 ③ 3 ④ 6

48. 미분방정식 $(y + x^2y) \frac{dy}{dx} - 2x = 0$ 을 만족시키는 곡선

$f(x, y) = 0$ 중에서 원점 $(0, 0)$ 을 지나는 곡선은 점 $(a, 2)$ 를 지난다. 양수 a 의 값은?

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

49. 미분방정식

$$x^2 y'' - 2xy' + 2y = 3 \sin(\ln x^2) \quad (x > 0)$$

의 해 $y = f(x)$ 가 $f(1) = \frac{9}{20}$, $f'(1) = -\frac{3}{10}$ 을 만족시킬 때, $f(e^\pi) + f(e^{\pi/4})$ 의 값은?

- ① $\frac{3}{10}$ ② $\frac{7}{20}$ ③ $\frac{2}{5}$ ④ $\frac{9}{20}$

50. 함수 $f(t) = \int_0^t e^{-\tau} \cosh(\tau) \cos(t-\tau) d\tau$ 의 라플라스 변환 (Laplace transform)은?

- ① $\frac{s}{(s-1)^2(s+1)}$ ② $\frac{1}{(s-2)(s+1)}$
③ $\frac{s}{(s+1)(s^2+1)}$ ④ $\frac{s+1}{(s+2)(s^2+1)}$

영어 정답표 [자연계열] ㉠ 형

문제번호	1	2	3	4	5	6	7	8	9	10
정 답	③	④	①	②	①	④	②	③	③	②
배 점	3	3	3	3	3	3	3	3	3	3

문제번호	11	12	13	14	15	16	17	18	19	20
정 답	④	②	③	④	②	②	①	④	③	③
배 점	3	3	3	3	3	3	3	3	3	3

문제번호	21	22	23	24	25	26	27	28	29	30
정 답	④	①	①	③	①	②	②	②	④	①
배 점	3	3	3	3	3	5	5	5	5	5

수학 정답표 [자연계열] ㉠ 형

문제번호	31	32	33	34	35	36	37	38	39	40
정 답	③	③	①	①	①	②	④	④	①	②
배 점	5	5	5	5	5	5	5	5	5	5

문제번호	41	42	43	44	45	46	47	48	49	50
정 답	④	①	③	④	③	③	③	②	①	④
배 점	5	5	5	5	5	5	5	5	5	5