2023학년도 건국대학교 편입학 필기고사

자 연 계

(A형)

○ **시험 시간은 14:00 ~ 15:00 (60분)입니다.**

○ 이 문제지는 **총 40문항**으로 구성되어 있습니다. 문제지 하단의 쪽수(현재 쪽/전체 쪽)를 보시고 페이지 누락여부를 확인한 후, 누락된 페이지가 있으면 즉시 감독자에게 말씀하셔서 문제지를 교체하시기 바랍니다.

○ **각 문항별로 배점이 상이**하므로 유의하시기 바랍니다.

○ 답안지에 **성명, 수험생 지원 모집단위, 수험번호, 문제 유형(A형/B형)을 정확하게 기재 또는 표기** 하십시오.
  (1) OMR 답안지에 수험생이 직접 쓰는 **① 성명, ② 지원모집단위, ③ 수험번호**
    - 반드시 **흑색 볼펜 또는 컴퓨터용 사인펜**만 사용하여 기재 (연필, 샤프, 색깔 볼펜 등 사용 불가)
  (2) OMR 답안지 상의 **① 수험번호 숫자 표기란, ② 문제유형(A형/B형), ③ 답안 표기란**
    - 반드시 **컴퓨터용 사인펜**만 사용하여 표기
  (3) 컴퓨터용 사인펜과 흑색 볼펜을 개인 지참하여 사용 가능
  (4) 수정테이프(수정액 사용 불가)를 사용하여 답안 수정 가능

○ 답안지 작성 시 **아래의 경우를 유의**하시기 바랍니다.
  (1) 답안지 전체 0점 처리
    · 문제지 유형(A형/B형)을 표기하지 않은 경우
    · 인적사항을 알 수 없는 경우(수험번호와 성명을 동시에 미기재)
    · OMR 답안지에 표기하는 것 이외에 불필요한 표시 및 낙서를 하거나 답안과 무관한 서술을 기입한 경우
      (예: 잘 부탁드립니다, 감사합니다, 수고하십시오 등)
    · 본인 신분을 나타낼 수 있는 표현 및 표시를 하는 경우
  (2) 해당 문항 0점 처리
    · 컴퓨터용 사인펜 이외의 필기구로 답안을 표기하거나 바른 방법으로 표기하지 않아 전산에 인식되지 않은 경우
    · 답안을 중복하여 표기한 경우

※ 시험이 시작되기 전에는 표지를 넘기지 마십시오.

편입구분	지원 모집단위	수험번호	성명
일반편입 / 학사편입			

※ [1-20번: 문항 당 2점]

[1-3] 밑줄 친 어휘와 의미가 가장 가까운 것을 고르시오.

1. Sensory and physical impairments <u>adversely</u> affect a student's educational performance and may include visual, auditory, and orthopedic impairments.

① abundantly   ② affirmatively   ③ incrementally
④ harmfully   ⑤ predominantly

2. Recovery from stage fright involved developing humility—recognizing that whatever his talent, he was <u>fallible</u>, and that an imperfect performance was not a disaster.

① faulty   ② impeccable   ③ dissonant
④ ingenious   ⑤ compulsory

3. A perfect <u>specimen</u> of Oriental ruby is the most precious stone, being worth many times the price of a diamond of the same size.

① type   ② sample   ③ definition
④ representation   ⑤ artifact

[4-5] 빈칸에 들어갈 가장 적절한 단어를 고르시오.

4. It is difficult to understand what you are reading if you do not know what it is about. Even when there are no difficult words or grammar, you cannot make sense of the sentences if you do not know the _____. Therefore, knowing the _____ is necessary in order to comprehend what you read.

① syntax   ② character   ③ organization
④ topic   ⑤ metaphor

5. Children have a range of _____ behaviors that signal to the parents that they need comfort—for example, a child might cry, follow or cling to the parent. The child is letting the parent know at this moment he needs attention and nurture.

① attachment   ② deduction   ③ adoration
④ mimicry   ⑤ empathy

[6-8] 밑줄 친 (A)~(E) 중 어법상 적절하지 <u>않은</u> 것을 고르시오.

6. Naturalistic studies are important within psychology because many studies are (A) <u>conducted</u> under the (B) <u>controlling</u> conditions of a laboratory or (C) <u>through</u> asking people about their behavior. Then, when a study (D) <u>takes place</u> "in the wild," psychologists sometimes observe that people's behavior in real settings (E) <u>differs</u>.

① (A)   ② (B)   ③ (C)   ④ (D)   ⑤ (E)

7. No one is (A) <u>sure</u> why these butterflies migrate or (B) <u>how</u> they navigate. All we know (C) <u>are</u> that they migrate (D) <u>by</u> the millions and that they come back every spring. There are too many things we don't know why, (E) <u>aren't there</u>?

① (A)   ② (B)   ③ (C)   ④ (D)   ⑤ (E)

8. In 1981, there were more than 4 million experiments on animals in Britain. They include everything from trials of new pet foods (A) <u>involving</u> no suffering whatsoever, to experiments (B) <u>which</u> dogs and monkeys are forced to smoke continuously. On the other hand, there (C) <u>have been</u> protests from animal rights groups about experiments on animals. In the last few years, extreme activists have raided laboratories and (D) <u>released</u> the animals. So attitudes to animals vary greatly between two extremes. Some of us regard animals simply as lumps of walking meat, (E) <u>while</u> others see them as almost human.

① (A)   ② (B)   ③ (C)   ④ (D)   ⑤ (E)

[9-15] 빈칸에 들어갈 말로 가장 적절한 것을 고르시오.

9. It is a common belief in every culture that the fruits and vegetables which have the best flavor are nutritionally _____. It is logical that our tastes would have evolved to lead us to the most valuable foods. Whether taste reflects the quality and quantity of vitamins, minerals and protein, or whether it is an index of other as yet undiscovered nutrients or properties of foods, has not been verified in the laboratory. Nevertheless, as a working hypothesis, it is probably safe to assume that produce which looks pretty but has no taste is less desirable in the diet.

① superior   ② deficient   ③ injurious   ④ controversial   ⑤ simple

10. Many agricultural chemicals have long been known to have toxic effects when improperly handled, stored, or applied. It is clear that neither manufacturers nor producers intended or wanted these consequences, and both groups have made efforts to mitigate and control unintended consequences. Nevertheless, unintended consequences of agricultural chemicals pose ethical problems in that it is impossible to _____ the risk of an unwanted event entirely.

① consolidate   ② stabilize   ③ eliminate   ④ take   ⑤ conceal

11. An American journalist Elizabeth Seaman achieved fame for the _____ way she obtained her stories. She felt the best way to get the real story was from the inside rather than as an outside observer. On one occasion she pretended to be a thief so that she would get arrested and see for herself how female prisoners were really treated. On another occasion she faked mental illness in order to be admitted to a mental hospital to get the real picture on the treatment of mental patients.

① careful and considerate   ② innovative and updated
③ philanthropic and humanistic   ④ humoresque and satiric
⑤ bold and adventuresome

12. Is bird song music? The thrush's song has some of the characteristics of music. It has rhythm, melody, repetition, and variation. It also has a(n) _____; scientists believe that birds sing to announce their presence in a particular territory to the other birds of the same kind, and that they sing to attract a mate. In some species one bird's song can tell the other birds which bird is singing and how that bird is feeling.

① harmony   ② imitation   ③ refrain
④ function   ⑤ composition

13. Scientists wondered for a long time just how whales are related to land mammals, especially the largest land mammal, the elephant. They believed there must have been some kind of in-between mammal that lived partly in the sea and partly on the land. They had _____, however, until the discovery of the bones of an animal scientists have called "Pakicetus." This large mammal, which was alive 50 million years ago, lived on the land but found its food in the water.

① never tried to prove this
② no doubt about its existence
③ no evidence for such an animal
④ been convinced of its extinction
⑤ a very strong belief in mammals

14. Many authors have implied that heritable traits are difficult or impossible to alter. Heritability is defined in percentages. If a characteristic is 0%, all differences in the trait are entirely determined by the environment, and if it is 100% heritable, then all differences are defined by genetics. The majority of personality traits are 60% heritable. Nevertheless, the fact that a trait is heritable does not mean we cannot _____ it. Instead, a high heritability means that current environmental factors impact minimally on individual differences in a trait. The figure does not relate to the potential effects of new environments.

① modify   ② corroborate   ③ endure
④ persuade   ⑤ investigate

15. Hormones are natural chemicals produced in the thyroid, ovaries, and other glands. Carried in the bloodstream to target tissues, each hormone exerts effects specific to the hormone. As one illustration, estrogen produced in the ovaries is transported to responsive tissues where it stimulates and maintains changes that make an animal female. At natural levels estrogens and other hormones exert actions vital to an animal's well-being. Only a tiny dose of a hormone is needed to react with the receptor although, up to a point, the response increases as the dose increases. ____(A)____, if the dose continues to rise, negative feedback comes into play and this can turn off the hormone's effect. So what will happen if an environmental hormone (pollutant) can mimic a hormone? Fortunately, a pollutant is a very weak "hormone" compared with the real one. ____(B)____, wildlife is often directly exposed to such pollutants and sometimes serious effects are seen.

	(A)		(B)
①	What is better	—	In conclusion
②	Therefore	—	Moreover
③	However	—	Nonetheless
④	For example	—	Instead
⑤	In contrast	—	Namely

16. 글의 흐름상 다음 문장이 들어가기에 가장 적절한 곳은?

The Harvard University Nurses' Health study reveals that women who eat two or more servings of vegetables a day may be able to reduce their risk of breast cancer by 17%.

Genes are not your total destiny. (A) No matter what your age or medical history, there are plenty of changes you can make today to reduce your risk for breast cancer. (B) First, eat a low-fat diet. The next time you have a craving for ice-cream, try reaching for a celery stick instead. Studies show that eating more vegetables may help prevent breast cancer. (C) American women consume three times as much fat as do women in Asia and have three times the risk of breast cancer. (D) When Asian women move to the U.S. and begin eating the high-fat American diet, their risk of breast cancer climbs. (E)

① (A)   ② (B)   ③ (C)   ④ (D)   ⑤ (E)

[17-18] 다음 글을 읽고 물음에 답하시오.

For many people, sitting still for a long time is one of the worst things about flying. Now doctors are discovering that there are good reasons to be unhappy about sitting still on long flights. ____(A)____, it is not good for you at all. The blood in your legs does not flow well and you are more likely to get a blood clot (a small lump) in your leg. The clot may cause swelling and pain in the leg because the blood cannot flow past it. More serious problems can develop if part of a clot breaks off and travels to the lung. In this case, there is even the risk of death. To avoid risk, doctors recommend moving around as much as possible during a flight. ____(B)____, you cannot stand up often or walk continually around the plane. But you can help the blood flow in your body by doing special exercises at your seat. Many airline companies now include instructions for these exercises in their in-flight magazines.

17. 빈칸 (A), (B)에 들어갈 말로 올바르게 짝지어진 것은?

	(A)		(B)
①	For example	—	In reality
②	In contrast	—	Consequently
③	In fact	—	Of course
④	For this reason	—	Naturally
⑤	However	—	In addition

18. 위 글의 제목으로 가장 적절한 것은?

① Never fear long flights!
② Blood clots: Threats to your health
③ Why you should move a lot in a plane
④ Uncomfortable truth about travelling by plane
⑤ Pros and cons of sitting still in a plane

[19-20] 다음 글을 읽고 물음에 답하시오.

Mathematics as taught in school is perceived by most students as a subject lacking history. The teacher becomes the source of all that has to be learned on the subject, and his task is to convey that knowledge to the student. Usually in the instructional process, the understanding of the process of mathematical creation and of the age-old grappling with mathematical problems are completely lost. Mathematics to most students is a ____(A)____ subject, located in the mind of the teacher who decides whether answers are correct or not. This situation is particularly harmful to mathematics teaching more than to teaching of most other sciences. Mathematics is by nature an accumulative subject; most of what was created millennia ago—both content and processes—is still ____(B)____ today. Exposing students to some of this development has the potential to make the subject fun and to humanize it for them.

19. (A), (B)에 들어갈 말로 올바르게 짝지어진 것은?

	(A)		(B)
①	reasonable	—	valid
②	fragmentary	—	reasonable
③	valid	—	open
④	remarkable	—	open
⑤	closed	—	valid

20. 위 글의 내용과 일치하지 않는 것은?

① 수학 문제 해결에는 대개 오랜 고투가 필요하다.
② 수학교사는 지식 전달보다 수학의 역사에 집중한다.
③ 교실에서 수학은 예, 아니오의 문제로 다루어지곤 한다.
④ 수학의 역사를 배움으로써 수학에 대해 친밀감을 느낄 수 있다.
⑤ 역사 교육의 부재는 다른 과학분야 보다 수학교육에서 더 해로울 수 있다.

21. 양의 실수 x와 y가 관계식 $x^2 + 3xy + y^2 = 5$를 만족할 때, 이계도함수 $\left. \dfrac{d^2 y}{dx^2} \right|_{x=1}$의 값은?

① $\dfrac{1}{5}$

② $\dfrac{2}{5}$

③ $\dfrac{3}{5}$

④ $\dfrac{4}{5}$

⑤ 1

22. 함수 $y = f(x)$의 도함수가 $f'(x) = \dfrac{1}{\sqrt{4 + x^2}}$일 때, $f(2)$의 값은? (단, $f(0) = 0$이다.)

① $\ln(\sqrt{2} - 2)$

② $\ln(\sqrt{2} - 1)$

③ $\ln\sqrt{2}$

④ $\ln(\sqrt{2} + 1)$

⑤ $\ln(\sqrt{2} + 2)$

23. $x = -1$에서 함수 $f(x) = \dfrac{4}{2x + 3}$의 테일러 급수의 7차항의 계수는?

① 4×3^7

② $4 \times (-3)^7$

③ 4×2^7

④ $4 \times (-2)^7$

⑤ $4 \times (-1)^7$

24. xy평면에서 세 직선 $x = 0$, $y = x$, $y = 1$에 의해 둘러싸인 영역을 D라 할 때, 다음 적분값은?

$$\iint_D 9x \sqrt{y^3 + 1} \, dA$$

① $2\sqrt{2}$

② $2\sqrt{2} - 1$

③ $3\sqrt{2}$

④ $3\sqrt{2} - 1$

⑤ $3\sqrt{2} - 2$

25. 삼차원 곡선 $\boldsymbol{r}(t) = \langle \cos t, \sin t, t^2 \rangle$, $0 \le t \le \pi$ 위의 점 P에서 접선이 평면 $x + \sqrt{3}\,y = 2$와 평행할 때, 점 P의 좌표는?

① $\left(\dfrac{\sqrt{3}}{2}, \dfrac{1}{2}, \dfrac{\pi^2}{36} \right)$

② $\left(\dfrac{\sqrt{2}}{2}, \dfrac{\sqrt{2}}{2}, \dfrac{\pi^2}{16} \right)$

③ $\left(\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}, \dfrac{\pi^2}{9} \right)$

④ $\left(0, 1, \dfrac{\pi^2}{4} \right)$

⑤ $\left(-\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}, \dfrac{4\pi^2}{9} \right)$

26. 원 $x^2 + y^2 = 8$ 위에서 함수 $f(x, y) = e^{xy}$의 최댓값을 M, 최솟값을 m이라 할 때 $M + m$은?

① $2e^4$

② $2e^6$

③ $e^4 + e^{-4}$

④ $e^6 + e^{-6}$

⑤ $e^8 + e^{-8}$

27. 멱급수 $\sum_{n=0}^{\infty} a_n (x-2)^n$이 $x=5$에서 수렴하고 $x=-2$에서 발산한다. 다음 중 항상 참인 것을 모두 구하시오.

> (가) $\sum_{n=0}^{\infty} (-3)^n a_n$는 발산한다.
>
> (나) $\sum_{n=0}^{\infty} a_n$는 수렴한다.
>
> (다) $\sum_{n=0}^{\infty} 5^n a_n$는 발산한다.

① 가, 나
② 나, 다
③ 가, 다
④ 가, 나, 다
⑤ 없다.

28. 식 $z=x^2+y^2$으로 주어진 곡면 모양의 그릇에 매 초 일정한 양의 물이 채워지고 있다. 시간 t일 때 물의 높이 $h=h(t)$의 변화율 $\dfrac{dh}{dt}$는 다음 중 어느 것에 비례하는가?

① $\dfrac{1}{h^4}$

② $\dfrac{1}{h^2}$

③ $\dfrac{1}{h}$

④ $\dfrac{1}{\sqrt{h}}$

⑤ h에 무관하게 일정하다.

29. 곡선 $y=\dfrac{\sin^{-1}x}{x+1}$와 x축, $x=1$로 둘러싸인 영역을 $x=-1$을 축으로 한 바퀴 회전하여 생기는 입체의 부피는?

① $\pi^2-3\pi$
② $\pi^2-2\pi$
③ $\pi^2-\pi$
④ $\pi^2+\pi$
⑤ $\pi^2+2\pi$

30. 미분가능한 이변수 함수 f와 g에 대하여 $g(x,y)=f(xy,x+y)$이 성립한다. $\nabla g(1,2)=\langle 2,3 \rangle$일 때, $|\nabla f(2,3)|$의 값은?

① 3
② $\sqrt{11}$
③ $\sqrt{13}$
④ $\sqrt{15}$
⑤ $\sqrt{17}$

31. 다음 급수의 값은?
$$\sum_{k=0}^{\infty} \frac{1}{2^k(k+1)}$$

① 0
② $\ln 2$
③ $2\ln 2$
④ $1+\ln 2$
⑤ $\ln 3 + \ln 2$

32. 점 P에서 함수 $f(x,y,z)$가 가장 빠르게 증가하는 방향이 $\langle 1,2,1 \rangle$이고, $\boldsymbol{v}=\dfrac{1}{\sqrt{2}}\langle 1,0,1 \rangle$에 대한 방향도함수가 $D_{\boldsymbol{v}}f(P)=\sqrt{6}$이다. $|\nabla f(P)|$의 값은?

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

33. 영역 $x^4 + y^4 \leq 1$의 넓이가 S일 때, 영역 $4x^4 + 9y^4 \leq 1$의 넓이는?

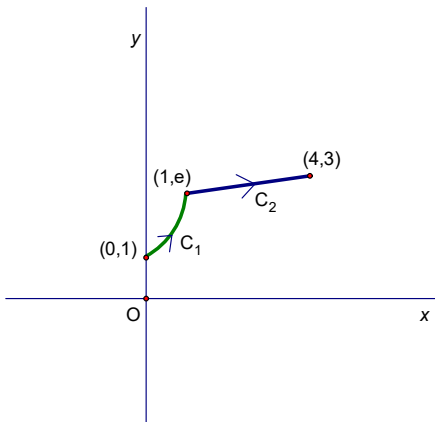① $\dfrac{1}{\sqrt{6}}S$

② $\dfrac{1}{6}S$

③ $\sqrt{6}\,S$

④ $6S$

⑤ $36S$

34. 이변수함수 $f(x,y) = \dfrac{x}{(x^2+y^2)^{\frac{3}{2}}}$에 대하여 원점을 제외한 직선 $y = kx$ 위의 모든 점에서 편도함수 $\dfrac{\partial f}{\partial x}$와 $\dfrac{\partial f}{\partial y}$의 값이 같다면, 양수 k의 값은?

① $\dfrac{\sqrt{17}-4}{2}$

② $\dfrac{\sqrt{17}-3}{2}$

③ $\dfrac{\sqrt{17}-2}{2}$

④ $\dfrac{\sqrt{17}-1}{2}$

⑤ $\dfrac{\sqrt{17}}{2}$

35. C_1은 $(0,1)$에서 $(1,e)$까지의 곡선 $y=e^x$의 호이고, C_2는 $(1,e)$에서 $(4,3)$까지의 선분이다. C가 C_1과 C_2의 합으로 이루어진 곡선일 때, 선적분 $\displaystyle\int_C (3+2xy)\,dx + (x^2 - 3y^2)\,dy$의 값은?

① 30

② 31

③ 32

④ 33

⑤ 34

36. 함수 $f(t) = \displaystyle\int_0^t \int_{\sqrt{y}}^{\sqrt{t}} (2x + \cos(x^2))\,dx\,dy$에 대하여, 미분계수 $f'(\frac{\pi}{2})$의 값은?

① $\dfrac{\pi}{6}$

② $\dfrac{\pi}{4}$

③ $\dfrac{\pi}{3}$

④ $\dfrac{\pi}{2}$

⑤ π

37. 점 $(0,0,0)$, $(1,0,0)$, $(0,1,0)$, $(0,0,1)$, $(1,1,0)$, $(1,0,1)$, $(0,1,1)$, $(1,1,1)$이 꼭짓점인 정육면체를 평면 $\dfrac{x}{2} + \dfrac{y}{3} + \dfrac{z}{4} = 1$로 자른 단면의 넓이는?

① $\dfrac{\sqrt{61}}{144}$

② $\dfrac{\sqrt{63}}{144}$

③ $\dfrac{\sqrt{65}}{144}$

④ $\dfrac{\sqrt{67}}{144}$

⑤ $\dfrac{\sqrt{69}}{144}$

38. 다음 정적분의 값은?
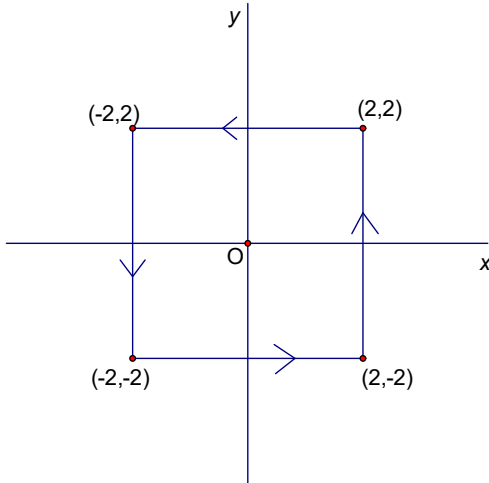$$\int_0^1 \sin\left(\tan^{-1} x + \cos^{-1} \frac{1}{\sqrt{1+x^2}}\right) dx$$

① 0

② $\ln 2$

③ 1

④ $\ln 3$

⑤ $2\ln 2$

39. 공 $x^2+y^2+z^2 \leqq 1$에서 $(x<0, y<0, z<0)$인 부분을 제외한 영역을 R라 하자. 평면 $z=z_0$에 의해 나뉜 두 영역 $R \cap (z \geqq z_0)$과 $R \cap (z \leqq z_0)$의 부피가 같을 때, z_0는 다음 중 어느 범위에 있는가?

① $\dfrac{1}{32} < z_0 < \dfrac{1}{16}$

② $\dfrac{1}{16} < z_0 < \dfrac{1}{8}$

③ $\dfrac{1}{8} < z_0 < \dfrac{1}{4}$

④ $\dfrac{1}{4} < z_0 < \dfrac{1}{2}$

⑤ $\dfrac{1}{2} < z_0 < 1$

40. 좌표평면에서 점 $(2,2)$, $(-2,2)$, $(-2,-2)$, $(2,-2)$, $(2,2)$를 차례대로 선분으로 연결하여 얻은 곡선을 C라 할 때, 다음 선적분의 값은?

$$\int_C \frac{-y}{x^2+y^2}dx + \frac{x}{x^2+y^2}dy$$

① 0

② $\dfrac{\pi}{2}$

③ π

④ 2π

⑤ $\dfrac{5}{2}\pi$