2018학년도
아주대학교 편입학 수강능력시험

자연계 A형

성 명	
전 형	
수험번호	

표지를 제외한 페이지 수: 15

※ Questions 1-4: Choose the expression that best completes the sentence.

---

1. (0.8 points) As is a tale, so is life: not how long it is, but how good it is, _____ .

① that matters
② matters how
③ how it matters
④ is what matters
⑤ is how it matters

2. (1.0 points) Two roads diverged in a wood, and I _____,
And that has made all the difference.

① take one by less traveled
② has taken one by less traveled
③ took the one less traveled by
④ had taken one less traveled by
⑤ had taken the one by less traveled

3. (1.1 points) He that is of the opinion money will do everything _____ doing everything for money.

① may well suspect
② may well be suspected of
③ may as well be suspected
④ may as well not suspect of
⑤ may as well not be suspected

4. (1.1 points) The only devils in this world are those running around in our own hearts, and that is where _____ .

① all our battles should fight
② whole our battles should fight
③ all our battles should be fought
④ whole our battles should be fought
⑤ the whole of our battles should fight

※ Questions 5-8: Choose the underlined word or phrase that must be changed for the sentence to be correct.

---

5. (0.8 points) An earthquake is a sudden, rapid shaking of the earth, ①caused by the breaking and shifting of subterranean rock ②during it releases strain that has accumulated ③over a long time. Initial mild shaking may strengthen and become extremely violent ④within seconds. Additional earthquakes, called aftershocks, may occur for hours, days, or even months. ⑤Most are smaller, but larger magnitude aftershocks also follow.

6. (1.0 points) The ability to laugh at ①one is an important mechanism that helps ②maintain emotional balance and a capacity to survive. Those who ③possess this ability can ④cope with difficult circumstances and ⑤prevail over any physical and social handicap.

7. (1.1 points) South Korea's candlelight vigil was the culmination of twenty ①successive weekly rallies which ②brought out over 16 million people to the streets. ③Attracting wide press coverage around the globe, the movement has been praised as an amazing feat that ④set an example to world democracy with the power of nonviolent resistance, which ⑤unprecedented in previous rallies.

8. (1.1 points) Oceans ①absorb a significant amount of the solar energy that reaches the Earth's surface because they cover 71 ②percent of the planet. Global warming affects oceans in several ways, one of the most serious ③being to cause icebergs and other sea ice to melt. Ironically, global warming ④has hastened the formation of icebergs, increasing the rate ⑤for which they melt into the sea.

※ Questions 9-12: Choose the number with a correct set of statements that can be restated or inferred from the original sentence.

---

9. (1.0 points) Beneath all the xenophobia, Islamophobia, homophobia, racism and sexism lies a fundamental misunderstanding about reality that something called separateness exists. In the face of escalating hatred and violence worldwide, it is impossible to overstate the importance of solidarity to unleash the power of peace.

(a) Hatred and violence are on the increase.
(b) Phobias, racism and sexism have led to separateness.
(c) The significance of solidarity cannot be stated too much.
(d) The statement on solidarity is a starting point to restore nonviolence.

① (a) & (b)
② (b) & (c)
③ (a) & (c)
④ (a), (c) & (d)
⑤ (b), (c) & (d)

10. (1.1 points) Different people give different reasons for wanting to get involved in environmental volunteering overseas. You do not even have to have a definite reason as long as you are genuinely interested in what the organization is striving to achieve, and want to work for a good cause.

(a) Some people go overseas as an environmental volunteer.
(b) The organization is making an effort to contribute to the environment.
(c) Environmental volunteering requires a specific reason to get involved.
(d) People want to become environmental volunteers when they have good reasons.

① (a) & (b)
② (a) & (c)
③ (b) & (d)
④ (a), (b) & (c)
⑤ (a), (c) & (d)

11. (1.0 points) The writing of history as we know it did not exist 2,500 years ago. Before Herodotus, the past was documented as a list of events with little or no attempt to explain their causes beyond accepting things as the will of the gods. Herodotus wanted a deeper, more rational understanding, so he took a new approach: Looking at events from both sides to understand the reasons for them.

(a) Herodotus was particularly interested in the reasons behind events.
(b) There was a change in the way of recoding the past before Herodotus.
(c) People before Herodotus documented a list of events as the work of the gods.
(d) History writing 2,500 years ago does not meet the standard of the present day.

① (a) & (c)
② (a) & (b)
③ (b) & (d)
④ (a), (b) & (c)
⑤ (a), (c) & (d)

12. (1.1 points) E. B. White wrote a short but metaphoric note on the meaning of democracy: Democracy is the recurrent suspicion that more than half of the people are right more than half of the time.

(a) The line doubts about the politics by the majority rule.
(b) Democracy is vulnerable to the probability in decision-making.
(c) There is a strong suspicion regarding the meaning of democracy.
(d) White gave a concrete definition about the nature of democracy.

① (a) & (b)
② (b) & (c)
③ (a) & (d)
④ (a), (b) & (c)
⑤ (a), (c) & (d)

※ Questions 13-25: Read each passage and answer the corresponding questions for each.

※ Questions 13 through 16 are based on the following passage.

[A] Salt is often used in ice cream makers to make the water surrounding the inside container cold enough to freeze the cream. Salt works to (a) _____ the freezing point of water so the water can become colder than 32 degrees Fahrenheit (zero degrees Celsius) before it turns to ice. In fact, water containing salt can reach temperatures of nearly minus 6 degrees F.

[B] When ice cream is made, cream is placed into a canister and rotated within an ice bath. If no salt is added to the ice bath, the lowest temperature it can reach is 32 degrees F. While the cream can freeze at this temperature, it can do so more quickly at a lower temperature. When salt is added to the ice bath (usually rock salt in ice cream making), it comes into contact with the thin layer of water on the surface of the melting ice. The salt dissolves and the water becomes salty. This salt water has a lower freezing point, so the temperature of the ice bath can get even colder, thus freezing the ice cream more quickly.

[C] The principle of salt lowering the freezing point of water is used frequently to keep roads safe in winter. During snow and ice events, trucks spread a thin layer of salt on roadways. This causes snow and ice to melt on impact rather than freeze and makes the roads wet rather than icy and dangerous. However, there is a limit to how cold water can become before freezing; in extremely frigid temperatures, applying sand to the roads to increase friction is more useful than applying salt. Types of salt other than sodium chloride can be used in colder temperatures. Calcium chloride and magnesium chloride, for example, can melt ice at low temperatures. However, some of these compounds can be detrimental to the environment and are used only occasionally.

[D] Does adding salt lower the boiling point of water? While salt will lower the freezing point of water, it does not lower the boiling point. Actually, (b)_____. Adding salt to water results in a phenomenon called boiling point elevation. The boiling point of water is increased slightly, but no enough that you would notice the temperature difference.

13. (1.0 points) Which of the following would be the best title for the above passage?

① Why is salt most valued?
② How does salt work on water?
③ How can we utilize salt in our daily life?
④ What are the scientific effects made possible by salt?
⑤ How are temperature and the physical states of water related?

14. (1.0 points) Which of the following CANNOT be inserted into the blank (a) in paragraph [A]?

① decrease
② depress
③ distend
④ drop
⑤ reduce

15. (0.8 points) Which of the following would best fit in the blank (b) in paragraph [D]?

① Salt will not affect the boiling point
② Salt will interfere boiling point elevation
③ Salty water will boil at a lower temperature
④ Salty water will boil at a higher temperature
⑤ Salt will substantially increase the boiling point

16. (1.0 points) According to the above passage, which of the following is NOT true?

① Sodium chloride can make water colder.
② Sodium chloride can lower the freezing point of water.
③ Sodium chloride can increase the boiling point of water.
④ Sodium chloride is more effective in producing friction than sand.
⑤ Sodium chloride and magnesium chloride can be used interchangeably.

※ Questions 17 through 20 are based on the following passage.

[A] Over the past decade, academic research has increasingly examined issues of multitasking and distraction as people try to squeeze more activities into their busy lives. ❶ As digital technology has become ubiquitous in many people's daily routines, researchers have tried to assess how humans are coping in this highly connected environment and how "chronic multitasking" may diminish our capacity to function effectively. ❷

[B] In 2009, a Stanford University study provided some of the most definitive evidence yet of (a) _____. While the study raised many unanswered questions and myriad research directions to pursue, Clifford Nash says that scholarship has remained firm in the overall assessment: "The research is almost (b) _____ which is very rare in social science, and it says that people who chronically multitask show an enormous range of deficits. They are basically terrible at all sorts of cognitive tasks, including multitasking." ❸

[C] Scholars from many different disciplines are designing experimental and observational studies of all kinds to assess how we may be changing our mental habits. ❹ As the Internet and Life project has found in conversations with experts on the subject, the very idea of "multitasking" continues to be debated and refined. The topic has also produced important book-length meditations informed by research, such as Sherry Turkle's *Alone Together,* Nicholas Carr's *The Shallows* and William Powers' s Hamlet's *Blackberry.*

[D] ❺ Research in the past few years has focused on how social networking technologies such as Facebook might affect offline performance and learning. Survey research from the Kaiser Family Foundation can also complement the academic studies on the way teens and Millennials are living highly connected lives.

17. (1.0 points) Which of the following best fits in the blank (a) in paragraph [B]?

① the range of research on multitasking
② the perils of multitasking in a digital age
③ the overall assessment on cognitive tasks
④ the assessment of deficits in cognition
⑤ the ubiquitous nature of the digital technology

18. (0.8 point) Which of the following can best fill in the blank (b) in paragraph [B]?

① anonymous
② incongruent
③ inconsistent
④ unanimous
⑤ untenable

19. (1.1 points) The following paragraph is removed from the passage. In which part may it be inserted to support the argument made by the author?

> Of particular interest to researchers have been the habits of, and outcomes for, young people—the so-called "Net Generation" or "digital natives." New research from students themselves suggests a higher rate of "supertaskers" among younger cohorts than has been previously reported.

① ❶
② ❷
③ ❸
④ ❹
⑤ ❺

20. (1.1 points) Which of the following is NOT true about the passage above?

① Issues of social science can rarely be resolved high consensus.
② The rate of supertakers among young people has been on the increase.
③ Multitasking may have a negative effect on certain cognitive functions, particularly in highly connected environments.
④ Researchers across a range of disciplines are conducting studies to investigate how people undergo changes due to multitasking.
⑤ The offline performance and learning by general population have been studied by surveying the potential influence of social networking technologies.

※ Questions 21 through 25 are based on the following passage.

[A] Why does the Hawaiian language flow melodically from vowel to vowel, whereas Georgian, a language of the Caucasus Mountains in Russia, is peppered with consonants? Scientists have long known that voices carry differently in dense forests versus open plains and in humid air versus dry air. ❶ Now, Ian Maddieson and Christophe Coupé say that the differences in languages' sounds are, in part, adaptations to the ecosystem and climate conditions. ❷

[B] The idea that humans will adapt the sounds they use to better communicate in their environment is not new to (a)_____. ❸ Birds such as the song sparrow, for example, sing at higher pitches in cities, where lower frequency notes would be drowned out by urban noise. And birds living in forested areas tend to sing at lower frequencies than birds living in open spaces, suggesting different species and populations may optimize their vocalizations to travel through branches and other obstacles that deflect high-frequency sounds. ❹

[C] Maddieson and Coupé attempted to answer to the question of how much acoustic adaptation occurs in human language by examining 633 languages worldwide. They found the variations are linked to ecological factors such as precipitation, vegetation, temperature, and geomorphology. Languages in hotter, more forested regions such as the tropics tended to be "sonorous," employing lower frequency sounds, whereas languages in colder, drier, more mountainous places were consonant-heavy. One possible explanation for why (b) vowel-rich languages appear more frequently in the tropics is that they travel farther than languages dominated by high-frequency consonants, which lose their fidelity in humid, forested environments: Heat and humidity interrupt sound, as do solid tree branches and leaves. ❺

[D] Although the findings remain purely correlational, without any experimental evidence, Maddieson notes, the notion that ecological factors such as tree cover could affect the sounds a language develops is "a totally reasonable idea."

21. (1.0 points) Which of the following is the best title of the above passage?

① The Evolution of Bird Songs and Human Languages
② The Adaptation of Bird Songs to Urban versus Rural Areas
③ The Nature of Sound Production Based on Frequency Levels
④ The Contrast between Consonant-heavy and Vowel-rich Languages
⑤ The Variation of Languages Depending on Environment and Climate

22. (0.8 points) Which of the following can best fill in the blank (a) in paragraph [B]?

① zoology
② biology
③ geology
④ sociology
⑤ psychology

23. (1.0 points) Which of the following factors does NOT relate to (b) vowel-rich languages in paragraph [C]?

① hilly terrains
② forested areas
③ warm weathers
④ tropical regions
⑤ greater humidity

24. (1.1 points) The following paragraph is removed from the passage. In which part may it be inserted to support the argument made by the author?

> "The phenomenon called acoustic adaptation is seen in species after species," of birds, bats, and other animals, says Caleb Everett, at the Univ. of Miami.

① ❶ ② ❷ ③ ❸
④ ❹ ⑤ ❺

25. (1.1 points) According to the above passage, which of the following is NOT true?

① Low frequency sounds travel farther than high frequency ones.
② Species alter their sounds to better communicate in their environment.
③ Birds in cities may sing more sonorous sounds than their counterparts as their songs to be heard amid the urban noise.
④ Woodland birds tend to emit lower frequency calls, since solid tree branches and other structures may distort their songs.
⑤ The levels of temperature and rainfall, the degree of tree cover, and ruggedness of terrains may affect the sounds of human languages.

※ (문제 26-50) 다음 물음에 답하라.

---

26. [0.8점] $\cos\left(\cos^{-1}\left(-\frac{4}{5}\right)+\sin^{-1}\left(\frac{12}{13}\right)\right)$의 값은?

① $-\frac{56}{65}$ ② $\frac{56}{65}$ ③ $-\frac{48}{65}$

④ $\frac{48}{65}$ ⑤ $\frac{8}{65}$

27. [0.8점] 함수 $f(x)=2e^{3x}+x$에 대하여 $(f^{-1})'(2)$의 값은?

① 1 ② $\frac{1}{2}$ ③ $\frac{1}{3}$

④ $\frac{1}{6}$ ⑤ $\frac{1}{7}$

28. [0.8점] 함수 f에 대한 다음 표를 이용하여 $g(u)=f(u^2+1)$의 $u=1$에서 일차 근사 함수(linear approximation)를 구하면?

a	$f(a)$	$f'(a)$
1	1	4
2	3	-2
2.21	2	1

① $8u-5$ ② $-4u-1$ ③ $8u+3$

④ $-4u+7$ ⑤ $u+1$

29. [0.8점] 곡선 $y+2\cosh(xy)-2x\cos(x-1)=0$ 위의 점 $(1,0)$에서의 접선의 기울기는?

① -4 ② -2 ③ 0

④ 2 ⑤ 4

30. [1.1점] 극한 $\lim_{x\to 0}\frac{\tan x-x}{\sin^{-1}x-x}$의 값은?

① -2 ② -1 ③ 0

④ 1 ⑤ 2

31. [1.1점] 정적분 $\int_0^{\frac{\pi}{4}} \left[\frac{1}{1+\tan x} - \frac{1}{2}\right] dx$의 값은?

① $\frac{1}{8}\ln 2$ ② $\frac{1}{4}\ln 2$ ③ $\frac{3}{4}\ln 2$

④ $\frac{\pi}{8}$ ⑤ $\frac{3\pi}{4}$

32. [1.0점] 이상 적분 $\int_0^{\infty} \frac{dx}{x^p + x^q}$ 가 수렴하기 위한 필요충분조건으로 옳은 것은? (단, $0 < p < q < \infty$)

① $p < 1,\ q > 1$ ② $p \le 1,\ q \ge 1$ ③ $q > p \ge 1$

④ $p + q > 2$ ⑤ $p + q \ge 2$

33. [1.0점] 평면상의 영역 $\{(x,y) : |x+1| + |y-1| \le 1\}$을 직선 $y = 2x$ 주위로 회전하여 얻어진 입체의 부피는?

① $\frac{12\pi}{\sqrt{5}}$ ② $\frac{8\pi}{\sqrt{5}}$ ③ $\frac{4\pi}{\sqrt{5}}$

④ $\frac{\sqrt{5}\,\pi}{4}$ ⑤ $\frac{\sqrt{5}\,\pi}{8}$

34. [1.0점] 평면상의 영역 $\{(x,y) : 0 \le y \le x^2,\ 0 \le x \le 1\}$의 무게 중심의 좌표는 $(0.75,\ a)$이다. 이때 a의 값은?

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

④ $\frac{2}{5}$ ⑤ $\frac{9}{20}$

35. [1.1점] 매개변수 곡선 $x = \sqrt{3}\,t^2,\ y = \int_0^t \sqrt{9s^4 + 4}\ ds,\ 0 \le t \le 1$의 길이는?

① 1 ② 2 ③ 3

④ 4 ⑤ 5

36. [1.1점] 이상 적분 $\int_1^{\infty} \frac{2x^3+3x^2+3}{x^3(x^2+1)}dx$의 값은?

① π ② $\pi+\frac{1}{2}$ ③ $\pi+1$

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

37. [1.1점] 평면상의 영역 $\left\{(x,y):\sin(x^2)\le y\le\cos(x^2),\ 0\le x\le\frac{\sqrt{\pi}}{2}\right\}$를 y-축 주위로 회전하여 얻어진 입체의 부피는?

① $(\sqrt{2}-1)\pi$ ② π ③ $\sqrt{2}\pi$

④ 2π ⑤ $(\sqrt{2}+1)\pi$

38. [0.8점] 무한급수에 대한 <보기>의 내용 중 옳은 것은 모두 몇 개인가?

<보기>

가. $\sum_{n=1}^{\infty}\frac{a_n}{n}$이 수렴하면 $\sum_{n=1}^{\infty}(-1)^n\frac{a_n}{n}$은 수렴한다.

나. $\sum_{n=1}^{\infty}(-1)^n\frac{a_n}{n}$ 이 수렴하면 $\sum_{n=1}^{\infty}\frac{a_n}{n}$은 수렴한다.

다. $\sum_{n=1}^{\infty}\frac{(-1)^n}{\ln(\ln(n+2018))}$은 절대수렴한다(absolutely convergent).

라. $\sum_{n=1}^{\infty}(-1)^n\sin^3\left(\frac{1}{\sqrt{n}}\right)$은 조건수렴한다(conditionally convergent).

① 0개 ② 1개 ③ 2개

④ 3개 ⑤ 4개

39. [1.1점] 무한급수 $\sum_{n=1}^{\infty}\left[\tan^{-1}(n+1)-\tan^{-1}(n-1)\right]$의 합은?

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

④ $\frac{3\pi}{4}$ ⑤ π

40. [1.0점] 멱급수 $\sum_{n=1}^{\infty}\frac{(3n)!}{(n!)^3}x^n$의 수렴 반경은?

① 3 ② 1 ③ $\frac{1}{3}$ ④ $\frac{1}{9}$ ⑤ $\frac{1}{27}$

41. [1.0점] 무한급수 $\sum_{n=1}^{\infty}(-1)^n\frac{(\sqrt{\ln 2})^{2n-1}}{n!}$의 합은?

① $-\frac{1}{2}$ ② $-\frac{1}{2\sqrt{\ln 2}}$ ③ 0

④ $\frac{1}{2\sqrt{\ln 2}}$ ⑤ $\frac{1}{2}$

42. [1.1점] 함수 $h(x)=x^4+3x^2+5x+2$에 대한 $x=1$에서의 2차 테일러 다항식을 $P(x)$라 할 때, $P(x)$의 최고차항의 계수는?

① -9 ② -6 ③ 0

④ 6 ⑤ 9

43. [1.0점] 꼭짓점의 좌표가 각각 $(0,0,0)$, $(1,2,3)$, $(0,4,7)$, $(-1,2,-5)$인 사면체의 부피는?

① 4 ② 5 ③ 6

④ 7 ⑤ 8

44. [1.0점] 꼬인 위치의 두 직선 $x-2=-y=z-1$과 $x=\frac{y-1}{-2}=\frac{z}{-3}$ 사이의 거리는?

① $\frac{1}{\sqrt{42}}$ ② $\frac{3}{\sqrt{42}}$ ③ $\frac{5}{\sqrt{42}}$

④ $\frac{3}{\sqrt{21}}$ ⑤ $\frac{5}{\sqrt{21}}$

45. [1.0점] 미분가능한 이변수 함수 $f(x,y)$에 대하여 $w=g(u,v)=f(u+2v^2+2,\ u^2-4v+1)$라 하자. 아래 표를 이용하여 $\left.\frac{\partial w}{\partial u}\right|_{(-1,0)}$의 값을 구하면?

(x,y)	f	f_x	f_y
$(-1,0)$	5	3	2
$(1,2)$	8	6	4

① -4 ② -2 ③ 0

④ 2 ⑤ 4

46. [1.0점] 삼각형 ΔABC에서 $c=\overline{AB}$는 3cm/sec, $b=\overline{AC}$는 1cm/sec, 그리고 이 두 변 사이의 각 α는 0.1라디언/sec의 변화율로 각각 증가한다면, $c=10\text{cm}$, $b=8\text{cm}$, $\alpha=\frac{\pi}{6}$일 때 삼각형의 넓이의 변화율은 몇 cm^2/sec인가?

① $2\sqrt{3}+8.5$ ② $2\sqrt{3}+7$ ③ $\sqrt{3}+8.5$

④ $\sqrt{3}+7.5$ ⑤ $\sqrt{3}+7$

47. [1.1점] 방정식 $x^4+y^2=1$을 만족하는 x와 y에 대한 $\frac{xy}{\sqrt{2}}$의 최댓값을 M이라 할 때, $\log_3 M$의 값은?

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

④ $-\frac{3}{4}$ ⑤ $\frac{1}{2}$

48. [1.1점] 다음 적분의 값은?

$$\int_0^1\left[\int_x^1 e^{y^2}dy\right]dx$$

① e ② $\frac{1}{2}(e-1)$ ③ $\frac{1}{2}(e+1)$

④ $e-1$ ⑤ $e+1$

49. [1.1점] 다음 적분의 값은?

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\frac{1}{(1+x^2+y^2)^3}\,dy\,dx$$

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

④ π ⑤ 2π

50. [1.0점] 극좌표 방정식 $r=2+\sin\theta$, $0\le\theta\le 2\pi$로 표현되는 곡선에 의해 둘러싸인 영역의 넓이는?

① π ② $\frac{3\pi}{2}$ ③ 2π

④ $\frac{9\pi}{2}$ ⑤ 5π