

2018학년도 송실대학교 편입학 시험 문제 (자연계)

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지망학과(부) :

수험번호 :

성명 :

문항배점 : [1-10] 1점 / [11-20] 2.5점 / [21-25] 3점 / [26-32] 1.7점 / [33-43] 2점 / [44-50] 2.3점

[1-2] Choose the one that is grammatically NOT correct. (각 1점)

[1] Most air filters improve air quality ① by trapping harmful pollutants in a filter. Molekule takes that idea one step further--② by destroying them altogether. The key is its specially coated nanofilter, which is designed ③ to react with light in a way that prevents toxins, including mold and bacteria particles, ④ to grow back.

[2] In the future, our cars will be smart, and our tires will be smarter. For starters, ① it's airless, eliminating the need to worry about pounds ② per a square inch. It's also made from recycled materials in an effort to reduce waste. But the most impressive feature may be ③ its 3-D-printed treads, which can be swapped ④ in and out to accommodate various road conditions.

[3-6] Choose the expression that is closest in meaning to the underlined part. (각 1점)

[3] Anyone who's ever sipped coffee knows how temperature can affect taste: if it's too hot, it'll scald your mouth; too cold and it's barely worth drinking.

- ① burn ② irritate ③ numb ④ torture

[4] "Makeup is like a secret weapon," says pop superstar Rihanna. "It can go from very subtle to a complete transformation." But for many, that secret weapon is too secret: makeup companies often cater to women with light to medium skin tones, both in products and advertising, and sideline women of color.

- ① beautify ② exclude ③ highlight ④ sidekick

[5] It took a long time for the earth to create the Alps--a lot longer than it's taking humans to wreck them.

- ① conquer ② exploit ③ ruin ④ sustain

[6] Prozac, an antidepressant drug, was introduced in 1987. It was an immediate hit: in just three years, 2 million people around the world were taking it, and pharmaceutical companies began churning out their own only slightly different versions of the drug soon after.

- ① mass-producing ② pilot-marketing
③ re-searching ④ re-transforming

[7-10] Choose the most appropriate word(s) for the blank. (각 1점)

[7] The same facial expressions are associated with the same emotions, regardless of culture or language. There are some facial expressions of emotion which are ----- characteristic of the human species.

- ① culturally ② linguistically ③ randomly ④ universally

[8] New gender-neutral terms such as caretaker and parenting are recently being used to try to avoid the stereotypical association of women with child care. Yet even the magazine called *Parenting*, which claims to address contemporary parents, displays mothers almost -----.

- ① conclusively ② equally ③ exclusively ④ never

[9] Many people give hospice ----- reviews. Lynn Pares enthused about her experience from 2013 to 2014 with Family Hospice of Colorado.

- ① awful ② glowing ③ indifferent ④ typical

[10] "I fell in love for the first time while I was still at school," she has revealed. "When I was in grade three, I had a ----- this really big guy. I can't think of his name now, but it was great."

- ① dream about ② problem with
③ rumor about ④ crush on

[11-13] Read the following passage and answer the questions. (각 2.5점)

Ponderosa pine* forests in the American West will die at an increasing rate as the world grows warmer, becoming less and less resilient when they are weakened by higher temperatures, according to new projections.

Although these forests now withstand short droughts, warming temperatures increasingly stress the forests, which means they will no longer survive the shorter droughts they once endured. And future droughts will be hotter as the planet warms.

"We're saying that if the climate warms a little more, things don't get (A) different, they get (B) different," said Henry Adams, a plant biologist at Oklahoma State University and lead author of a new paper, "Focus on Tree Mortality in a Warming World," published in *Environmental Research Letters*. "You get an acceleration in the rate of mortality."

"Long droughts are what it takes to kill trees," Dr. Adams said. "As you crank up the heat though, the time it takes to kill trees is less and less."

This study is significant because rather than looking at the effects of a single temperature increase, it examines the effects of multiple increases that provide a more realistic forecast.

"The confidence we've developed about our forests being at great risk is really high now," said David D. Breshears, a professor of natural resources at the University of Arizona and co-author of the paper. "Warming makes droughts more lethal."

Dr. Breshears said that the research shows that warming temperatures and drought alone could cause 9 or 10 additional forest die-offs during this century by killing seedlings. "It's not sustainable if you knock out a forest every ten or twelve years," Dr. Breshears said. "We are at a big risk of losing lots and lots of forest." The researchers also say that they believe the results of this study apply to many other types of forests around the world.

Such die-offs can lead to a state change, a radical shift in which the forest disappears and becomes a different type of (C), perhaps a grassland or shrub land.

*ponderosa pine: 소나무의 일종

[11] Which of the following sets best fits in (A) and (B)?

- ① a little - very ② very - a little
③ partially - totally ④ totally - partially

[12] Which of the following best fits in (C)?

- ① geography ② forest ③ shift ④ ecosystem

[13] Which of the following is true?

- ① A ponderosa pine forest disappears every year.
② Dr. Breshears has high confidence in the sustainability of forests.
③ Warming and droughts are destructive combination for forest loss.
④ Drought alone could cause 9 or 10 additional deforestation during this century.

[14-15] Read the following passage and answer the questions. (각 2.5점)

A diet of fiber-rich foods, such as fruits and vegetables, reduces the risk of developing diabetes, heart disease and arthritis. Indeed, the evidence for fiber's benefits extends beyond any particular ailment: people who eat more of it simply have lower odds of dying. That's why experts are always saying how good dietary fiber is for us. But while the benefits are clear, it's not so clear why fiber is so great. "It's an easy question to ask and a hard one to really answer," said Fredrik Bäckhed, a biologist. He and other scientists are running experiments that are yielding some important new clues about fiber's role in human health.

as morality, religion, epistemology, psychology, ontology, and social criticism. Because of Nietzsche's evocative style and his often outrageous claims, his philosophy generates passionate reactions running from love to disgust. Nietzsche noted in his autobiographical *Ecce Homo* that his philosophy developed over time, so interpreters have found it difficult to relate concepts central to one work to those central to another, for example, the thought of the eternal recurrence features heavily in *Also sprach Zarathustra* (*Thus Spoke Zarathustra*), but is almost entirely absent from his next book, *Beyond Good and Evil*. Added to this challenge is the fact that Nietzsche did not seem concerned to develop his thought into a system, even going so far as to disparage the attempt in *Beyond Good and Evil*.

Nietzsche saw nihilism as the outcome of repeated frustrations in the search for meaning. He diagnosed nihilism as a latent presence within the very foundations of European culture, and saw it as a necessary and approaching destiny. The religious worldview had already suffered a number of challenges from contrary perspectives grounded in philosophical skepticism, and in modern science's evolutionary and heliocentric theory. Nietzsche saw this intellectual condition as a new challenge to European culture, which had extended itself beyond a sort of point-of-no-return. Nietzsche conceptualizes this with the famous statement "God is dead," which first appeared in his work in section 108 of *The Gay Science*, again in section 125 with the parable of "The Madman," and even more famously in *Thus Spoke Zarathustra*. The statement, typically placed in quotation marks, accentuated the crisis that Nietzsche argued that Western culture must face and transcend in the wake of the irreparable dissolution of its traditional foundations, moored largely in classical Greek philosophy and Christianity. In aphorisms 55 and 56 of *Beyond Good and Evil*, Nietzsche talks about the ladder of religious cruelty that suggests how Nihilism emerged from the intellectual conscience of Christianity. Nihilism is sacrificing the meaning "God" brings into our lives, for "matter and motion," physics, "objective truth." In aphorism 56, he explains how to emerge from the utter meaninglessness of life by reaffirming it through the Nietzsche's ideal of Eternal Return.

[21] Which of the following would be best for the title?

- ① Nietzsche's Influence on Modern Intellectuals
- ② The Search for Central Concepts in Nietzsche
- ③ Classical Greek Philosophy As the Cause of Nihilism
- ④ Religious Cruelty in Traditional Christianity

[22] Which of the following is NOT what makes it hard to interpret Nietzsche's works?

- ① development of ideas over time
- ② provocative and outrageous style
- ③ lack of a central idea in his works
- ④ his own attitude to do away systematic thoughts

[23] Which of the following is NOT true?

- ① Conscientious Christians caused the emergence of nihilism.
- ② The traditional religious worldview was supported by modern science.
- ③ Nihilism resulted from the failure of the search for meaning.
- ④ The ideal of Eternal Return was proposed as a cure for nihilism.

[24-25] Read the following passage and answer the questions. (각 3점)

The central thesis of *Capital in the Twenty-first Century* by Thomas Piketty is that inequality is not an accident, but rather a feature of capitalism, and can only be reversed through state interventionism. The book thus argues that, unless capitalism is reformed, the very democratic order will be threatened.

Piketty bases his argument on a formula that relates the rate of return on capital (r) to economic growth (g), where r includes profits, dividends, interest, rents and other income from capital and g is measured in income or output. He argues that when the rate of growth is low, then wealth tends to accumulate more quickly from r than from labor and tends to accumulate more among the top 10% and 1%, increasing inequality. Thus the fundamental force for divergence and greater wealth inequality can be summed up in the inequality $r > g$. He analyzes inheritance from the perspective of the same formula.

The book argues that there was a trend towards higher inequality which was reversed between 1930 and 1975 due to unique circumstances: the two world wars, the Great Depression and a debt-fueled recession destroyed much wealth, particularly that owned by the elite. These events prompted governments to undertake steps towards redistributing income, especially in the post-World War II period. The fast, worldwide economic growth of that time began to reduce the importance of inherited wealth in the global economy.

The book argues that the world today is returning towards "patrimonial capitalism," in which much of the economy is dominated by inherited wealth: the power of this economic class is increasing, threatening to create an oligarchy. Piketty cites novels by Honoré de Balzac, Jane Austen and Henry James to describe the rigid class structure based on accumulated capital that existed in England and France in the early 1800s.

Piketty proposes that a progressive annual global wealth tax of up to 2%, combined with a progressive income tax reaching as high as 80%, would reduce inequality, although he concedes that such a tax "would be politically impossible."

[24] Which of the following is NOT true?

- ① Inequality is an inevitable part of capitalism.
- ② Oligarchy presupposes the absence of inherited money.
- ③ The lower the rate of growth, the more the income of the rich.
- ④ Annual global wealth tax could help to reduce inequality.

[25] Which of the following is NOT Piketty's suggestion?

- ① state's intervention
- ② reformation of capitalism
- ③ patrimonial capitalism
- ④ progressive income tax

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[26] $y(x)$ 가 미분방정식 $x \frac{dy}{dx} = y + 2$ 를 만족하고 $y(1) = 5$ 일 때, $y(2)$ 의 값은? (1.7점)

- ① $\frac{9}{2}$ ② 10 ③ 12 ④ 15

[27] 다음 중 $f(x, y) = x^2y + xy^2 - 3xy$ 의 임계점이 아닌 것은? (1.7점)

- ① (0, 0) ② (0, 3) ③ (3, 0) ④ (3, 3)

[28] 이상적분 $\int_0^{\infty} \frac{e^x}{1+e^{2x}} dx$ 의 값은? (1.7점)

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

[29] 극좌표계에서 곡선 $r = 3 \cos \theta$ ($0 \leq \theta \leq \frac{\pi}{2}$)의 길이는? (1.7점)

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

[30] 두 점 (1, 2, 3)과 (5, -1, 4)로부터 같은 거리에 있는 점들로 이루어진 평면의 방정식은? (1.7점)

- ① $4x - 3y + z = 14$ ② $4x + 2y - 5z = 13$
 ③ $3x - y - z = 6$ ④ $x + y - z = 0$

[31] 영역 $D = \{(x, y) \mid x^2 + y^2 \leq 1, |x| \leq y\}$ 에 대하여 이중적분 $\iint_D \sqrt{x^2 + y^2} dA$ 의 값은? (1.7점)

- ① $\frac{\pi}{4}$ ② $\frac{\pi}{6}$ ③ $\frac{\pi}{8}$ ④ $\frac{\pi}{12}$

[32] 곡선 $2x + \sin(x + y) = 0$ 위의 점 $(0, \pi)$ 에서 접선의 기울기는? (1.7점)

- ① -1 ② 0 ③ $\frac{1}{2}$ ④ 1

[33] 다음 중 $x = 0$ 에서 연속이 아닌 함수는? (2.0점)

- ① $f(x) = \begin{cases} xe^{\frac{1}{x}} & (x \neq 0) \\ 0 & (x = 0) \end{cases}$ ② $g(x) = \begin{cases} \frac{1 - \cos x}{x} & (x \neq 0) \\ 0 & (x = 0) \end{cases}$
 ③ $h(x) = \begin{cases} x \sin \frac{1}{x} & (x \neq 0) \\ 0 & (x = 0) \end{cases}$ ④ $k(x) = \begin{cases} 0 & (x: \text{유리수}) \\ x & (x: \text{무리수}) \end{cases}$

[34] $(x - \pi)^3 \sin x = \sum_{n=0}^{\infty} a_n (x - \pi)^n$ 일 때 a_6 는? (2.0점)

- ① 0 ② $\frac{1}{3!}$ ③ $-\frac{1}{6!}$ ④ $\frac{\pi}{6!}$

[35] 함수 $f(x) = x^3 e^{-kx}$ 가 $x = 1$ 에서 변곡점을 갖게 하는 모든 k 의 값들의 곱은? (2.0점)

- ① -15 ② 6 ③ 9 ④ 15

[36] 반복적분 $\int_0^1 \int_0^{\cos^{-1}y} \sin x \sqrt{1 + \sin^2 x} dx dy$ 의 값은? (2.0점)

- ① $\frac{2\sqrt{2}-1}{3}$ ② $\frac{\pi-1}{6}$ ③ $\frac{2\cos 1 - \pi}{6}$ ④ $\frac{1}{3}$

[37] 특성다항식이 $p(\lambda) = (\lambda - 1)^2(\lambda - 2)(\lambda - 4)$ 인 4×4 행렬 A 에 대하여 다음 중 옳은 것을 모두 고르면? (2.0점)

가. 행렬식은 $\det(A) = 8$ 이다.
 나. 대각합은 $\text{tr}(A) = 7$ 이다.
 다. 역행렬 A^{-1} 가 존재한다.

- ① 가, 나 ② 가, 다 ③ 나, 다 ④ 가, 나, 다

[38] 방정식 $1 - 2\cos^2(\tan^{-1}x) = 0$ 의 모든 실수해의 합은? (2.0점)

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

[39] $f(x, y, z) = \lim_{h \rightarrow 0} \frac{x(y+h)^2 e^{(y+h)z} - xy^2 e^{yz}}{h}$ 일 때 $f(1, -1, 0)$ 은?

(2.0점)

- ① -2 ② -1 ③ -e ④ -2e

[40] 곡선 $y = x^2 - 3x$ 와 직선 $x + y = 0$ 으로 둘러싸인 부분을 y 축을 중심으로 회전하여 얻은 입체의 부피는? (2.0점)

- ① $\frac{4}{3}\pi$ ② $\frac{7}{3}\pi$ ③ $\frac{8}{3}\pi$ ④ $\frac{10}{3}\pi$

[41] 시간 t 에서의 물체의 위치를 나타내는 함수 $s(t)$ 가 $\frac{ds}{dt} = \frac{1}{s^2 + s + 1}$ 을 만족할 때, $s = 1$ 인 지점에서 출발하여 $s = 2$ 인 지점에 도달하는 데 소요되는 시간은? (2.0점)

- ① $\frac{14}{3}$ ② $\frac{29}{6}$ ③ 5 ④ $\frac{31}{6}$

[42] 다음 중 수렴하는 급수의 개수는? (2.0점)

가. $\sum_{n=1}^{\infty} \frac{1}{n} \sin\left(\frac{1}{n}\right)$ 나. $\sum_{n=1}^{\infty} \frac{2^n}{n(n+1)}$ 다. $\sum_{n=1}^{\infty} \frac{\sqrt{n^3+1}}{n^4+3}$

- ① 0개 ② 1개 ③ 2개 ④ 3개

[43] $n \times n$ 대칭행렬 A 에 대하여 다음 중 옳지 않은 것은? (2.0점)

- ① A 의 역행렬이 존재하면 A^{-1} 가 대칭행렬이다.
 ② A^2 이 대칭행렬이다.
 ③ $A + A^2$ 이 대칭행렬이다.
 ④ S 가 역행렬을 갖는 $n \times n$ 행렬이면 $S^{-1}AS$ 가 대칭행렬이다.

[44] 함수 $f(x) = \left(\frac{2}{x}\right)^{2x}$ ($x > 0$)가 $x = a$ 에서 극댓값을 가질 때, a 의 값은? (2.3점)

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

[45] 수열 $a_n = \frac{1}{\sqrt{n}} \left(\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \dots + \frac{1}{\sqrt{n}} \right)$ 의 극한값 $\lim_{n \rightarrow \infty} a_n$ 은?

(2.3점)

- ① 1 ② $\frac{3}{2}$ ③ 2 ④ ∞

[46] 다음 중 부등식 $\left| \int_0^1 e^{-x^2} dx - A \right| < \frac{1}{42}$ 을 만족하는 A 는?

(2.3점)

- ① $\frac{13}{20}$ ② $\frac{23}{30}$ ③ $\frac{33}{40}$ ④ $\frac{43}{50}$

[47] 함수 $f(x) = \int_1^{2x+3} \frac{1}{t^4 - 2t^2 + 3} dt$ 에 대하여 $g = f^{-1}$ 일 때 $g'(0)$ 의 값은? (2.3점)

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

[48] 양항급수 $\sum_{n=1}^{\infty} a_n$ 이 수렴할 때, 다음 중 옳은 것을 모두 고르면?

(2.3점)

가. $\sum_{n=1}^{\infty} a_n^2$ 은 수렴한다.
 나. $\sum_{n=1}^{\infty} (-1)^n a_n$ 은 수렴한다.
 다. $\sum_{n=1}^{\infty} \frac{\sqrt{a_n}}{n}$ 은 수렴한다.

- ① 가 ② 가, 나 ③ 나, 다 ④ 가, 나, 다

[49] 급수 $\sum_{n=1}^{\infty} \frac{1}{n3^n}$ 의 합은? (2.3점)

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

[50] 구면좌표로 표시된 다음 입체 V 의 부피는? (2.3점)

$$V = \left\{ (\rho, \theta, \phi) \mid 0 \leq \rho \leq 1, 0 \leq \theta \leq \pi, 0 \leq \phi \leq \frac{\pi}{3} \right\}$$

- ① $\frac{\pi}{3}$ ② $\frac{\pi}{4}$ ③ $\frac{\pi}{6}$ ④ $\frac{\pi}{8}$