

※ [11~13] Read the following and answer the questions. [4.5 points each]

In this exhibition of the sculptor, the emphasis is on the interrelationship between two unique elements, natural stones and iron plates. (A) Whereas his stones are found in nature, iron plates are clearly manufactured and highly refined materials. (B) While the difference between the two is that stone is of the natural and iron plates are of the artificial, these two elements share a common denominator in that they both originated from nature. (C)

Although the stones in the exhibition are at first glance similar, upon closer observation each stone reveals itself as unique. By harmonizing the ㉠_____ and ㉡_____ of stones, this unity engenders deep resonance in the space. Through the artist, stone lets go of its natural quality allowing it to move closer to human nature. (D) Likewise, iron plate lets go of its artificial quality in order to step closer to nature. Stone and iron plate, consequently, are placed in a process of ㉢_____.

11. Which best fits into the blanks ㉠ and ㉡?

- | | |
|----------------|---------------|
| ㉠ | ㉡ |
| ① uniqueness | singularity |
| ② peculiarity | artificiality |
| ③ similarity | commonness |
| ④ universality | individuality |

12. Which best fits into the blank ㉢?

- | | |
|------------------|------------------|
| ① conflict | ② humanity |
| ③ naturalization | ④ reconciliation |

13. Which is the best place for the following sentence?

It is this tension between their common source and obvious material differences that the artist exploits, successfully creating a space of both conflict and intimacy.

- ① (A) ② (B) ③ (C) ④ (D)

※ [14~17] Read the following and answer the questions. [4.5 points each]

[I] This promising system will work only if governments enforce existing rules. Like other vessels, fishing boats are required to carry transponders that indicate their position, speed and direction. Captains may switch their transponders off, of course. But the very act of doing so will be noticed, and will immediately suggest they are, as it were, up to something ㉠fishy.

[II] Until now, trying to stop this illegal trade has been more or less futile. The oceans are vast. Navies and coastguard patrols are small. That, though, is changing through the use of "big data." It is now feasible to synthesize information from sources such as radio transponders and satellite observations, in order to track every ocean-going vessel that is, or might be, a fishing boat. Such data can show when a vessel is behaving suspiciously in a prohibited area. They can also link particular vessels with the receiving ships to which they transfer their catches for transport to market.

[III] Overfishing is reaching catastrophic levels. According to a recent study, stocks of the biggest predatory species, such as tuna and swordfish, may have fallen by 90% since the 1950s. Another study suggests extinction is ㉡on the cards for many species. This matters for numerous reasons, not the least of which is that a lot of people rely on fish as part of their regular diet. The problem is that one fish in five sold in a shop or served in a restaurant has been caught illegally. That amounts to 26 million tons of fish a year, worth more than \$23 billion.

[IV] There is a nice irony in this development. Overfishing is the product not just of human greed, but also of technologies such as sonar that have made finding and catching fish far more efficient in recent decades. It is a matter for celebration that technology is now up to the task of catching ㉢_____.

14. Which is closest in meaning to the underlined ㉠fishy?

- | | |
|------------|----------------|
| ① extinct | ② suspicious |
| ③ feasible | ④ catastrophic |

15. Which is closest in meaning to the underlined ㉡on the cards?

- ① likely to happen
 ② on the dining menu
 ③ inconceivable by any means
 ④ controllable with some effort

16. Which best fits into the blank ㉢?

- ① more fish than ever before
 ② fish not illegally but legally
 ③ illegal fishermen as well as fish
 ④ particular vessels with radio transponders

17. Which is the proper order of the four paragraphs [I]~[IV]?

- ① [I]-[II]-[IV]-[III]
- ② [II]-[I]-[III]-[IV]
- ③ [III]-[II]-[I]-[IV]
- ④ [IV]-[III]-[II]-[I]

※ [18~20] Read the following and answer the questions. [4 points each]

U.S. worker productivity rose 3 percent in the third quarter, the best showing in three years, while labor costs fell for a second straight quarter. The increase in productivity in the July-September quarter was double the 1.5 percent gain in the second quarter and both quarters were up significantly from a scant 0.1 percent rise in the first three months of the year. Labor costs fell 0.2 percent after an even bigger 1.2 percent decline in the second quarter. The third quarter figure for productivity was unchanged from an initial estimate while labor costs were initially estimated to have risen by 0.5 percent. Economists are hopeful that the downturn in productivity may be a sign that this key measure of living standards is improving after a prolonged period of weakness. Economists believe finding ways to increase productivity, the amount of output per hour of work is the biggest challenge facing the economy right now.

18. Which is NOT properly used in the context of the passage?

- ① A ② B ③ C ④ D

19. Which is NOT mentioned in the passage?

- ① labor cost change in the first quarter
- ② labor cost change in the third quarter
- ③ productivity change in the first quarter
- ④ productivity change in the third quarter

20. Which is true according to the passage?

- ① U.S. labor cost is rising.
- ② U.S. worker productivity is declining.
- ③ Productivity is a key measure of living standards.
- ④ Labor cost estimation for the third quarter was correct.

※ [21~22] Read the following and answer the questions. [4 points each]

Imagine the day when a blood test could predict whether you are likely to have a heart attack within five years, thus allowing you and your medical practitioner to do everything possible to avoid such an event.

Well, another simple blood test developed by researchers at the National Heart and Lung Institute, Imperial College London, promises to do just that.

If clinical trials are successful, instead of using age, sex, cholesterol and blood pressure levels and medical history to evaluate your risk of heart problems, the new test looks at protective antibodies that already exist in your system. These immune-system-produced antibodies, called IgG, seem to shield the body from a heart attack, even when cholesterol and blood pressure are high.

A five-year study found that patients with the lowest levels of IgG antibodies had the highest risk of heart attack, while those who had high levels of IgG were less likely to suffer from cardio-vascular disease. The findings will enable doctors to be more efficient in identifying those who need to be more closely monitored. If the blood test reveals low levels of IgG, patients can be given a_____ therapies before their condition escalates.

21. Which best fits into the blank a?

- ① inept ② established
- ③ ultimate ④ preventative

22. Which is NOT true according to the passage?

- ① The lower the levels of IgG, the more likely that a patient will have heart problems.
- ② Protective IgG antibodies produced by a patient's immune system will play a pivotal role in the new blood test.
- ③ Doctors are currently using the newly developed blood test to predict whether a person will have a heart attack in the near future.
- ④ So far such factors as age, sex, and medical history, etc. of a patient have been largely used by doctors to predict his/her risk of heart problems.

※ [23~25] Read the following and answer the questions. [4 points each]

Undervaluing ㉠_____ is a common mistake. Top managers frequently put the best technical people in charge, not the best leaders. These technically oriented managers, in turn, mistakenly assume that ideas will speak for themselves if they are any good, so they neglect external communication. Or they emphasize tasks over ㉡relationships, missing opportunities to enhance the ㉢team chemistry necessary to turn undeveloped concepts into useful innovations.

Groups that are convened without attention to interpersonal skills find it difficult to embrace collective goals, take advantage of the different strengths various members bring, or communicate well enough to share the ㉣tacit knowledge that is still unformed and hard to document while an innovation is under development. It takes time to build the trust and ㉤interplay among team members that will spark great ideas. MIT researchers have found that for R&D team members to be truly productive, they have to have been on board for at least two years.

23. Which best fits into the blank ㉠?

- ① the scarcity of best leaders
- ② the importance of communication
- ③ the power of undeveloped concepts
- ④ the benefit of technically oriented managers

24. Which is most different in meaning from the other three?

- ① ㉡ ② ㉢ ③ ㉣ ④ ㉤

25. Which is NOT true according to the passage?

- ① Good ideas speak for themselves.
- ② It takes time to develop effective teamwork.
- ③ Technically oriented leaders may not encourage communication.
- ④ Interpersonal skills are important for productive communication in a group.

30. 다음 중 참인 것을 모두 고르면? [5.5 점]

- (가) 폐구간 $[a,b]$ 에서 정의된 함수 $f(x)$ 가 연속이고 역함수 $f^{-1}(x)$ 가 존재하면, $f(x)$ 는 (a,b) 에서 증가함수 또는 감소함수이다.
- (나) 폐구간 $[a,b]$ 에서 연속인 함수 $f(x)$ 는 $[a,b]$ 에서 최댓값과 최솟값을 가진다.
- (다) 폐구간 $[a,b]$ 에서 정의된 함수 $f(x)$ 가 개구간 (a,b) 에서 미분가능하면, $f(x)$ 는 $[a,b]$ 에서 최댓값을 가진다.
- (라) 미분가능한 두 함수 $f(x)$ 와 $g(x)$ 가 개구간 (a,b) 에서 $f(x) > g(x)$ 이면, 동일한 구간에서 $f'(x) > g'(x)$ 이다.

- ① (가), (나) ② (가), (다)
 ③ (나), (라) ④ (다), (라)

31. 다음 급수 중 수렴반경이 가장 큰 것은? [6.5 점]

- ① $\sum_{n=1}^{\infty} n^{2018} x^n$
 ② $\sum_{n=1}^{\infty} \left(1 + \frac{1}{2} + \dots + \frac{1}{n}\right) x^n$
 ③ $\sum_{n=1}^{\infty} \frac{n!(n+1)!}{(2n)!} x^n$
 ④ $\sum_{n=2}^{\infty} \frac{1}{(\ln n)^{2018}} x^n$

32. 임의의 두 실수 정사각행렬 A 와 B 에 대하여 다음 중 참인 것을 모두 고르면? [6.5 점]

- (가) $\det(AB) = \det(B)\det(A)$
 (나) A 가 가역(invertible)일 때, $\det(A^{-1}) = \det(A)$
 (다) $\det(A^T) = \det(A)$ (A^T : A 의 전치(transpose)행렬)
 (라) A 가 직교(orthogonal) 행렬일 때, $\det(A) = 1$
 (마) A 와 B 가 닮음(similar)일 때, $\det(A) = \det(B)$
 (바) $\text{tr}(AB) = \text{tr}(BA)$

- ① (가), (다), (마), (바)
 ② (가), (나), (다), (바)
 ③ (가), (다), (라), (마)
 ④ (나), (라), (마), (바)

33. 다음 중 연속함수를 모두 고르면? [6.5 점]

- (가) $f(x) = \begin{cases} \frac{\sin x}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$
 (나) $f(x) = \begin{cases} x \sin \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$
 (다) $f(x,y) = \begin{cases} \frac{2xy}{x^2+y^2}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$
 (라) $f(x,y) = \begin{cases} 0, & xy \neq 0 \\ 1, & xy = 0 \end{cases}$

- ① (가), (나), (다) ② (가), (나)
 ③ (가), (나), (라) ④ (다), (라)

34. $f(x) = -4x(x-1)$ 일 때, 구간 $0 < x < 1$ 에서 $f^{2018}(x)$ 의 미분불가능한 점의 개수는? [8 점]

$$\text{단, } f^n(x) = \begin{cases} f(x), & n=1 \\ f(f^{n-1}(x)), & n \geq 2 \end{cases}$$

- ① 2017 개 ② 2018 개
 ③ $2^{2017} - 1$ 개 ④ $2^{2018} - 1$ 개

35. 곡선 C 를 매개변수방정식

$$\mathbf{r}(t) = (\sqrt{2} \cos t, \sqrt{2} \sin t), \quad (0 \leq t \leq \pi/4)$$

로 정의할 때, 벡터장 $\mathbf{F}(x, y) = (y, x)$ 에 대한 선적분

$$\int_C \mathbf{F} \cdot d\mathbf{r}$$

의 값은? [6.5 점]

- ① 0 ② 1
 ③ $\sqrt{2}$ ④ $-\sqrt{2}$

36. 함수 $f(x) = x^3 - x$ 에 대하여 $f(f(x)) = f(x)$ 를 만족하는 실수 x 의 개수는? [6.5 점]

- ① 1 개 ② 3 개
 ③ 5 개 ④ 7 개

37. 극좌표평면상에서 곡선 $r = 2\sqrt{2}(1 + \cos \theta)$ 로 둘러싸인 영역의 넓이는? [8 점]

- ① 6π ② 12π
 ③ 8π ④ 16π

