Undergraduate Entrance Academic Proficiency Test for International Students in China - 21/12/2025

Time: 120 minutes
Total Marks: 100

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1. If sets $A = \{1,2\}, B = \{1,2,3\}$, then
A. $B \subseteq A$
B. $A = B$
C. $A \in B$
D. $A \subseteq B$

2. If sets $A = (-1,3), B = \{2,4\}$, then $A \cap B =$
A. $\{2, 3\}$
B. $\{2, 3\}$
C. $(2, 3)$
D. $(2, 3)$

3. The solution set of the quadratic inequality $x^2 - 5x + 4 < 0$is
A. $(-4, -1)$
B. $(-\infty, 1) \cup (4, +\infty)$
C. $(-\infty, -4) \cup (-1, +\infty)$
D. $(1, 4)$

4. The domain of the function $y = \frac{1}{x+1}$is
A. $[-1, +\infty)$
B. $(-1, +\infty)$
C. $(0, +\infty)$
D. $(-\infty, -1)$

5. If $\{a_n\}$is an arithmetic sequence with first term $a_1 = 2$and common difference $d = 3$, then $a_{100} =$
A. 302
B. 305
C. 299
D. 298

6. The point $(-1, 3 - \pi)$lies in which quadrant of the Cartesian coordinate system?
A. Third quadrant
B. First quadrant

C. Second quadrant

D. Fourth quadrant

7. $\left(\sin\frac{\pi}{4}+\cos\frac{\pi}{4}\right)\times\tan\frac{\pi}{4}=$

A. $2\sqrt{2}$

B. 2

C. $\sqrt{2}$

D. 1

8. Which of the following functions is odd?

A. $y=x\sin x$

B. $y=x^4\cos x$

C. $y=\cos x$

D. $y=\sin x$

9. The inverse function of $y=x^3$ is

A. $y=\frac{x}{3}$

B. $y=3^x$

C. $y=x^3$

D. $y=\sqrt[3]{x}$

10. Which of the following functions is strictly increasing?

A. $y=\left(\frac{1}{3}\right)^x$

B. $y=\log_{0.5}x$

C. $y=2x+1$

D. $y=\sin x$

11. Which point lies in the third quadrant?

A. $(-1,-2)$

B. $(-1,2)$

C. $(1,2)$

D. $(1,-2)$

12. The solution set of the rational inequality $\frac{x-1}{x-2}\leq 1$ is

A. $(2,+\infty)$

B. $[1,2)$

C. $(-\infty, 2)$
D. $(-\infty, 1]$

13. Given a, b, c form an arithmetic sequence and satisfy $a + c = 20$, then $b =$
A. 10
B. 5
C. 20
D. 0

14. The inclination angle of the line $y = \sqrt{3}x + 10$
is
A. $60°$
B. $30°$
C. $45°$
D. $120°$

15. Which inequality is correct?
A. $0.75^{-0.2} > 0.75^{-0.4}$
B. $3^{4.5} > 3^5$
C. $2^{4.5} < 2^5$
D. $2^5 < 2^5$

16. If point $P(1, y)$ lies on the terminal side of angle α and $\tan \alpha = 2$, then $y =$
A. 1
B. $\frac{1}{2}$
C. $\sqrt{3}$
D. 2

17. Given $\{a_n\}$ is an arithmetic sequence with $a_1 = 1$, $a_2 = 2$, then $a_{2025} =$
A. 2
B. 2025
C. 2024
D. 20

18. If a circle has center $(-3,2)$ and radius 4, its equation is
A. $(x+3)^2 + (y-2)^2 = 4$
B. $(x-3)^2 + (y+2)^2 = 4$
C. $(x-3)^2 + (y+2)^2 = 16$
D. $(x+3)^2 + (y-2)^2 = 16$

19. Given $\sin\ \alpha = \frac{3}{5}$ and α is in the second quadrant, then $\cos\ \alpha =$

A. $\frac{4}{5}$

B. $\frac{4}{5}$

C. $\frac{3}{4}$

D. $\frac{3}{4}$

20. The domain of the function $y = \sqrt{x-1}$ is

A. $[1, +\infty)$

B. $(1, +\infty)$

C. $(-\infty, 1]$

D. $(-\infty, 1)$

21. Given the circle equation $x^2 + y^2 + 2x - 2y = 0$, the radius of this circle is

A. 2

B. $\frac{1}{2}$

C. $\sqrt{2}$

D. 1

22. If α is an acute angle and $\sin\ \alpha = \frac{\sqrt{3}}{2}$, then $\tan\ \alpha =$

A. $\frac{1}{2}$

B. $\frac{\sqrt{3}}{2}$

C. $\frac{1}{4}$

D. $\frac{\sqrt{3}}{3}$

23. Given a geometric sequence $\{a_n\}$ whose first three terms are 1, 2, and 4, its general term formula is

A. $a_n = 2n$

B. $a_n = 8$

C. $a_n = 2^{n-1}$

D. $a_n = 2^n$

24. Given $a > b$, then

A. $\frac{1}{a} < \frac{1}{b}$

B. $a^2 > b^2$

C. $5^a > 5^b$

D. $\sin\ a > \sin\ b$

25. The distance from point $P(-1,2)$ to point $Q(3,1)$ is

A. $\sqrt{17}$

B. $\sqrt{13}$

C. $\sqrt{5}$

D. 5

26. Which description of the function $y = (\frac{1}{2})^x$ is correct?

A. The function is symmetric about the origin.

B. The function is symmetric about the x-axis.

C. The function is increasing.

D. The function is decreasing.

27. If $\sin\ \alpha = \frac{1}{4}$, then $\cos\ 2\alpha =$

A. $-\frac{7}{8}$

B. $\frac{1}{8}$

C. $\frac{7}{8}$

D. $-\frac{1}{8}$

28. The intersection point of lines $l_1: y = 2x + 1$ and $l_2: x + y + 1 = 0$ is

A. $\left(\frac{1}{3}, \frac{2}{3}\right)$

B. $\left(\frac{2}{3}, \frac{1}{3}\right)$

C. $\left(-\frac{1}{3}, -\frac{2}{3}\right)$

D. $\left(-\frac{2}{3}, -\frac{1}{3}\right)$

29. The coordinates of the foci of the hyperbola $x^2 - y^2 = 1$ are

A. $(\pm\sqrt{2}, 0)$

B. $(0, \pm 2)$

C. $(0, \pm\sqrt{2})$

D. $(\pm 2, 0)$

30. $\log_2 32 + \log_3 32 =$

A. -5

B. 10

C. 0

D. 5

31. Regarding the function $y = \cos x$, which statement is correct?

A. $\cos(x + \pi) = \cos x$

B. The function is odd.

C. The function is increasing on the interval $[0, \pi]$.

D. The function is periodic with period 2π.

32. Regarding the parabola $y^2 = 4x$, which statement is correct?

A. It passes through the point $(-4,4)$.

B. Its axis of symmetry is $x = 0$.

C. Its focus coordinates are $(\pm 1,0)$.

D. Its focus coordinate is $(1,0)$.

33. Which line is perpendicular to the line $l: x + y + 3 = 0$?

A. $y = -2x + 1$

B. $y = x + 3$

C. $y = 1 - x$

D. $y = 2x + 1$

34. Given $\cos \alpha = -\frac{1}{2}, \alpha \in (\frac{\pi}{2}, \pi)$, the value of $\sin \frac{\alpha}{2}$ is

A. $-\frac{\sqrt{3}}{2}$

B. $\frac{\sqrt{3}}{2}$

C. $\frac{1}{2}$

D. $-\frac{1}{2}$

35. Given $\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}, \sin \frac{\pi}{6} = \frac{1}{2}$, it can be deduced that $\cos \frac{\pi}{12} =$

A. $\frac{\sqrt{6}}{4}$

B. $\frac{\sqrt{6}+\sqrt{2}}{4}$

C. $\frac{\sqrt{6}+\sqrt{2}}{4}$

D. $\frac{1+\sqrt{3}}{4}$

36. Which function is the same as $y = |x|$?

A. $y = \sqrt[3]{x^3}$

B. $y = (\sqrt{x})^2$ (Note: $x > 0$)

C. $y = x$

D. $y = \sqrt{x^2}$

37. If α is an acute angle and $\cos\ \alpha = \frac{1}{2}$, then $\sin\ \frac{\alpha}{2} =$

A. $\pm\frac{\sqrt{3}}{2}$

B. $\pm\frac{1}{2}$

C. $\frac{\sqrt{3}}{2}$

D. $\frac{1}{2}$

38. Regarding reduction formulas, which equation is incorrect?

A. $\cos\ (2\pi - \alpha) = \cos\ \alpha$

B. $\tan\ (\pi + \alpha) = -\tan\ \alpha = \tan\ \alpha$

C. $\sin\ (\pi - \alpha) = \sin\ \alpha$

D. $\sin\ \left(\frac{\pi}{2} - \alpha\right) = \cos\ \alpha$

39. The directrix of the parabola $y^2 = -x$ is

A. $x = \frac{1}{2}$

B. $x = -\frac{1}{2}$

C. $x = \frac{1}{4}$

D. $x = -\frac{1}{4}$

40. Given $\frac{\cos\ \alpha - \sin\ \alpha}{\cos\ \alpha + \sin\ \alpha} = \frac{1}{3}$, find $\tan\ \alpha$.

A. $\frac{1}{2}$

B. $\frac{1}{4}$

C. $\frac{2}{3}$

D. $\frac{1}{3}$

41. If the sequence $\{a_n\}$ satisfies $a_1 = 1$, $a_{n-1} = \frac{1}{1+\frac{1}{a_{n-1}}} (n \geq 2)$, then $a_{100} =$

A. 50

B. $\frac{1}{100}$

C. 1

D. 100

42. Regarding the logarithmic function $y = \log_a x$, which statement is correct?

A. Its domain is $(-\infty, +\infty)$.

B. When $a > 1$, it is a decreasing function on its domain.

C. When $a > 1$, for all $x > 0$, $\log_a x > 1$.

D. When $0 < a < 1$, it is a decreasing function on its domain.

43. Regarding the ellipse $\frac{x^2}{4} + \frac{y^2}{20} = 1$, which statement is correct?

A. Its foci are $(0, \pm 4)$.

B. Its foci are $(\pm 4, 0)$.

C. Its vertices are $(\pm 4, 0)$ and $(0, \pm 20)$.

D. The lengths of its major and minor axes are 20 and 4, respectively.

44. If a line is perpendicular to the line $l_1: x + 2y + 4 = 0$ and passes through the intersection of the lines $l_2: x + y + 1 = 0$ and $l_3: 2x + y - 1 = 0$, then the equation of this line is

A. $x + 2y - 3 = 0$

B. $2x + y - 5 = 0$

C. $2x - y - 7 = 0$

D. $x - 2y - 1 = 0$

45. Let O be the origin, A and B be two points in the plane, and P be the midpoint of AB. Then the vector $\overrightarrow{OP} =$

A. $\overrightarrow{OB} - \overrightarrow{OA}$

B. $\overrightarrow{OA} + \overrightarrow{OB}$

C. $\overrightarrow{OB} - \overrightarrow{OA}$

D. $\frac{1}{2}(\overrightarrow{OB} - \overrightarrow{OA})$

46. If a complex number z satisfies $z^3 = 1$ and $z \neq 1$, then $1 + z + z^2 + \ldots + z^{999} =$

A. 1

B. -1

C. $\frac{1}{2}$

D. 0

47. Given an arithmetic sequence $\{a_n\}$ satisfies $3(a_2 + a_6) + 2(a_6 + a_{10} + a_{14}) = 24$, then $S_{13} =$

A. 104

B. 52

C. 39

D. 26

48. The Chinese zodiac consists of twelve animals representing years in a cycle: Rat, Ox, Tiger, Rabbit, Dragon, Snake, Horse, Goat, Monkey, Rooster, Dog, and Pig. For example,

people born in 1984, 1996, and 2008 were born in the Year of the Rat, while those born in 1985, 1997, and 2009 were born in the Year of the Ox, and so on. The probability that at least two out of three randomly chosen people share the same zodiac animal is

A. $\frac{17}{72}$

B. $\frac{1}{12}$

C. $\frac{55}{72}$

D. $\frac{143}{144}$