CSCA Sample Questions - Mathematics

Multiple-Choice Questions (Each question has four options among which only one is correct.)

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1. The inverse function of $y = 3x - 2$ is ( ).

- A. $y = (x + 3)/2$

- B. $y = (x - 3)/2$

- C. $y = (x + 2)/3$

- **D. $y = (x - 2)/3$ ✓**

2. The solution set of the inequality $(x - 3)/(x + 1) \geq 0$ is ( ).

- A. $(-\infty, -1] \cup [3, +\infty)$

- **B. $(-\infty, -1) \cup [3, +\infty)$ ✓**

- C. $(-\infty, -3] \cup [1, +\infty)$

- D. $(-\infty, -3] \cup (1, +\infty)$

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

- A. 3

- B. 4

- C. $\sqrt{26}$

- **D. $\sqrt{10}$ ✓**

4. If $a < b$ and $c < d$, which of the following is correct? ( )

- A. $a^2 < b^2$

- B. $a - c < b - d$

- C. $ac < bd$

- **D. $c^3 < d^3$ ✓**

5. If $\cos \alpha = -1/4$, then $\cos 2\alpha = $ ( ).

- **A. -7/8 ✓**

- B. -3/16

- C. 1/2

- D. 3/4

6. The foci of the hyperbola $x^2/4 - y^2/5 = 1$ have coordinates ( ).

- A. $(0, \pm 3)$

- **B. $(\pm 3, 0)$** ✓

- C. $(0, \pm 1)$

- D. $(\pm 1, 0)$

7. If the sum of the first n terms of the sequence $\{a_n\}$ is given by $S_n = n^2 - 1$, then $a_{10} = $ ( ).

- A. 18

- **B. 19** ✓

- C. 20

- D. 21

8. Which of the following lines is parallel to $3x + y - 1 = 0$? ( )

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

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

- **C. $6x + 2y - 3 = 0$** ✓

- D. $6x - 2y + 1 = 0$

9. If $\cos \alpha = -1/2$ and $\pi < \alpha < 3\pi/2$, then $\sin(\alpha/2) = $ ( ).

- **A. $\sqrt{3}/2$** ✓

- B. $-\sqrt{3}/2$

- C. $-\sqrt{3}/2$

- D. $1/2$

10. The domain of the function $y = 5\tan(x - \pi/4)$ is ( ).

- **A. $\{x \mid x \neq k\pi + 3\pi/4, k \in Z\}$** ✓

- B. $\{x \mid x \neq k\pi + \pi/4, k \in Z\}$

- C. $\{x \mid x \neq 2k\pi + 3\pi/4, k \in Z\}$

- D. $\{x \mid x \neq 2k\pi + \pi/4, k \in Z\}$

11. A sequence $\{a_n\}$ satisfies $a_1 = 2$, $a_n = 1 + 1/a_{n-1}$ $(n \geq 2)$. Then $a_4 = $ ( ).

- A. 3/2

- B. 5/3

- **C. 8/5 ✓**

- D. 13/8

12. The solution set of the inequality $\log_2(3 - x) > 0$ is ( ).

- A. $(1, 3)$

- B. $(-\infty, 3)$

- C. $(2, +\infty)$

- **D. $(2, 3)$ ✓**

13. If a function satisfies $f(2x - 1) = 3x + 3$, then $f(-3) = $ ( ).

- A. -3

- B. 0

- C. 6

- **D. -5 ✓**

14. Which of the following is correct? ( )

- A. $(0.3)^{2.1} > (0.2)^{2.1}$

- **B. $(2.1)^{0.12} < (2.2)^{0.12}$ ✓**

- C. $(3.2)^{1.1} > (3.2)^{0.9}$

- D. $(0.25)^{1.5} > (0.25)^{1.4}$

15. Let be two vectors. Then ( ). *Note: Vector information is missing in the original document*

- A. $(1, 1)$

- **B. $(0, 3)$ ✓**

- C. 4

- D. $(-2, -2)$

16. A bag contains five equal-sized balls. Three of them are black and two of them are red. Two balls are drawn randomly from the bag. The probability that the balls have the same color is ( ).

- A. 1/5

- **B. 2/5 ✓**

- C. 3/5

- D. 4/5

17. Suppose that the center of an ellipse C is at the origin, and the foci are on the x-axis. Suppose also that it has a vertex at (0, 1), and an eccentricity of $(2\sqrt{5})/5$. The equation of C is ( ).

- A. $x^2/20 + y^2/4 = 1$

- B. $x^2/4 + y^2/20 = 1$

- C. $x^2 + y^2/5 = 1$

- **D. $x^2/5 + y^2 = 1$ ✓**

18. Suppose that a complex number z satisfies $(1 + i)^2 = 3z + 2i$, where i is the unit imaginary number. Then z = ( ).

- A. 3/2 - i

- B. 3/2 + i

- C. 1/3 - 2i

- **D. 1/3 + 2i ✓**

19. The maximum value of the function $f(x) = 2x^3 - 3x^2 - 36x + 1$ over the interval [-3, 4] is ( ).

- A. 63

- B. 1

- C. 28

- **D. 45 ✓**

20. The angle between the planes $x + 2y - z + 1 = 0$ and $x - 2y + z - 3 = 0$ is ( ).

- A. $\pi/3$

- B. $2\pi/3$

- **C. arccos(1/6) ✓**

- D. π - arccos(1/6)

Answer Key

Q	1	2	3	4	5	6	7	8	9	10
Answer	D	B	D	D	A	B	B	C	A	A

Q	11	12	13	14	15	16	17	18	19	20
Answer	C	D	D	B	B	B	D	D	D	C