2022-Jul-28 Shift-2

AI24BTECH11003 - Badde Vijaya Sreyas

1) Let $S = \left\{ x \in [-6, 3] - \{-2, 2\} : \frac{|x+3|-1}{|x|-2} \ge 0 \right\}$ and $T = \left\{ x \in \mathbb{Z} : x^2 - 7|x| + 9 \le 0 \right\}$. Then

2) Let α, β be roots of the equation $x^2 - \sqrt{2}x + \sqrt{6} = 0$ and $\frac{1}{\alpha^2} + 1, \frac{1}{\beta^2} + 1$ be the roots of the equation $x^2 + ax + b = 0$. Then the roots of the equation $x^2 - (a + b - 2)x + (a + b + 2) = 0$

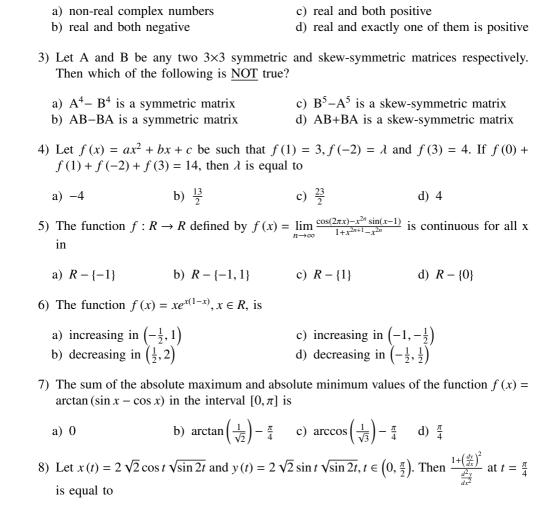
c) 4

d) 3

the number of elements in $S \cap T$ is

b) 5

a) 7



a)	$-2\sqrt{2}$
	3

b)
$$\frac{2}{3}$$

c)
$$\frac{1}{3}$$

d)
$$\frac{-2}{3}$$

9) Let
$$I_n(x) = \int_0^x \frac{1}{(t^2+5)^n} dt$$
, $n = 1, 2, 3 \cdots$ Then

a)
$$50I_6 - 9I_5 = xI_5'$$

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 b) $50I_6 - 11I_5 = xI_5'$ c) $50I_6 - 9I_5 = I_5'$ d) $50I_6 - 11I_5 = I_5'$

$$50I_6 - 9I_5 = I_5'$$

$$d) \ 50I_6 - 11I_5 = I_5'$$

10) The area enclosed by the curves $y = \log_e(x + e^2)$, $x = \log_e(\frac{2}{v})$ and $x = \log_e 2$, above the line y = 1 is

a)
$$2 + e - \log_e 2$$

a)
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 b) $1 + e - \log_e 2$ c) $e - \log_e 2$

c)
$$e - \log_e 2$$

d)
$$1 + \log_e 2$$

11) Let y = y(x) be the solution curve of the differential equation $\frac{dy}{dx} + \frac{1}{x^2 - 1}y = \left(\frac{x - 1}{x + 1}\right)^{\frac{1}{2}}$, x > 1passing through the point $\left(2, \sqrt{\frac{1}{3}}\right)$. Then $\sqrt{7}y(8)$ is equal to

a)
$$11 + 6 \log_e 3$$

c)
$$12 - 2\log_e 3$$

c)
$$12 - 2\log_e 3$$
 d) $19 - 6\log_e 3$

12) The differential equation of the family of circles passing through the points (0,2) and (0, -2) is

a)
$$2xy\frac{dy}{dx} + (x^2 - y^2 + 4) = 0$$

c)
$$2xy\frac{dy}{dx} + (y^2 - x^2 + 4) = 0$$

b)
$$2xy\frac{dy}{dx} + (x^2 + y^- + 4) = 0$$

d)
$$2xy\frac{dy}{dx} - (x^2 - y^2 + 4) = 0$$

13) Let the tangents at two points A and B on the circle $x^2 + y^2 - 4x + 3 = 0$ meet at the origin O(0,0). Then the area of the triangle OAB is

a)
$$\frac{3\sqrt{3}}{2}$$

b)
$$\frac{3\sqrt{3}}{4}$$

c)
$$\frac{3}{2\sqrt{3}}$$

d)
$$\frac{3}{4\sqrt{3}}$$

14) Let the hyperbola $H: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ pass through the point $(2\sqrt{2}, -2\sqrt{2})$. A parabola is drawn whose focus is same as the focus of H with positive abscissa and the directrix of the parabola passes through the other focus of H. If the length of the latus rectum of the parabola is e times the length of the latus rectum of H, where e is the eccentricity of H, then which of the following points lies on the parabola?

a)
$$(2\sqrt{3}, 3\sqrt{2})$$

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$$(2\sqrt{3}, 3\sqrt{2})$$
 b) $(3\sqrt{3}, -6\sqrt{2})$ c) $(\sqrt{3}, -\sqrt{6})$ d) $(3\sqrt{6}, 6\sqrt{2})$

c)
$$(\sqrt{3}, -\sqrt{6})$$

d)
$$(3\sqrt{6}, 6\sqrt{2})$$

15) Let the lines $\frac{x-1}{\lambda} = \frac{y-2}{1} = \frac{z-3}{2}$ and $\frac{x+26}{-2} = \frac{y+18}{3} = \frac{z+28}{\lambda}$ be coplanar and P be the plane containing these two lines. Then which of the following points does NOT lie on P?

a)
$$(0, -2, -2)$$

a)
$$(0,-2,-2)$$
 b) $(-5,0,-1)$ c) $(3,-1,0)$

c)
$$(3, -1, 0)$$

d)
$$(0,4,5)$$