2020 January 8 Shift 1

EE24BTECH11001 - ADITYA TRIPATHY

16. Let two points be A$(1, -1)$ and B$(0, 2)$. If a point P(x', y') be such that area of $\Delta PAB = 5$sq. units and it lies if the line, $3x + y - 4\lambda = 0$, then the value of λ is :

    a) 4 b) 1 c) -3 d) 3

17. The shortest distance between the lines
$$\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{-1}$$
And
$$\frac{x+3}{3} = \frac{y+7}{2} = \frac{z-6}{1} \tag{1}$$

    a) $2\sqrt{30}$ b) $\frac{7\sqrt{30}}{2}$ c) 3 d) $3\sqrt{30}$

18. Let the line $y = mx$ and the ellipse $2x^2 + y^2 = 1$ intersect a point P in the first quadrant. If the normal to this ellipse at P meets the co-ordinate axes at $\left(\frac{-1}{3\sqrt{2}}, 0\right)$ and $(0, \beta)$, then β is equal to

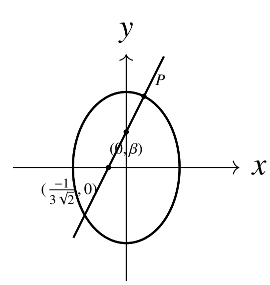
    a) $\frac{2}{\sqrt{3}}$ b) $\frac{2}{3}$
    c) $\frac{2\sqrt{2}}{3}$ d) $\frac{\sqrt{2}}{3}$

19. If c is a point at which Rolle's Theorem holds for the function,
$$f(x) = \log_e\left(\frac{x^2 + \alpha}{7x}\right) \tag{2}$$
in the interval $(3, 4)$, where $\alpha \in R$, then $f''(c)$ is equal to :

    a) $\frac{-1}{24}$ b) $\frac{-1}{12}$ c) $\frac{\sqrt{3}}{7}$ d) $\frac{1}{12}$

20. Let
$$f(x) = x\cos^{-1}(\sin(-|x|)), x \in \left(\frac{-\pi}{2}, \frac{\pi}{2}\right) \tag{3}$$
, then which of the following is true

    a) $f(0) = \frac{-\pi}{2}$
    b) f' is decreasing in $\left(\frac{-\pi}{2}, 0\right)$ and increasing in $\left(0, \frac{\pi}{2}\right)$

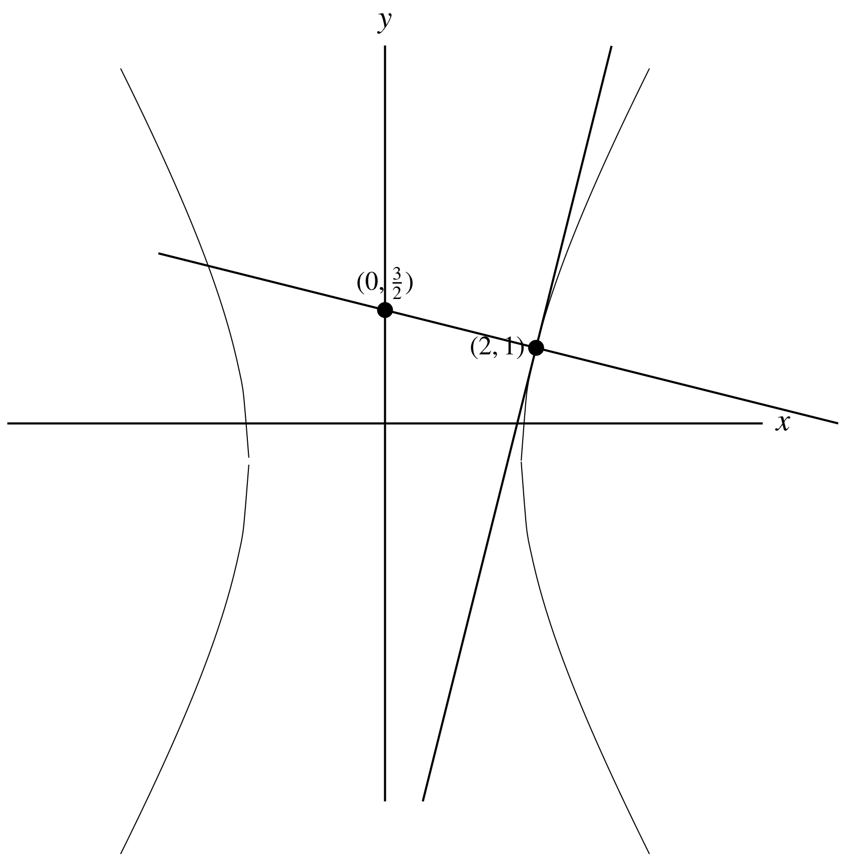


c) f is not differentiable at $x = 0$

d) f' is increasing in $\left(\frac{-\pi}{2}, 0\right)$ and decreasing in $\left(0, \frac{\pi}{2}\right)$

21. An urn contains 5 red marbles, 4 black marbles and 3 white marbles. Then the number of ways in which 4 marbles can be drawn so that at most three of the are red is.

22. Let the normal at a point P on the curve $y^2 - 3x^2 + y + 10 = 0$ intersect the y-axis at $\left(0, \frac{3}{2}\right)$. If m is the slope of the tangent at P to the curve, te $|m|$ is equal to



23. The least positive value of $'a'$ for which the equation

$$2x^2 + (a - 10)\,x + \frac{33}{2} = 2a \tag{4}$$

has real roots is

24. The sum

$$\sum_{k=1}^{20} (1 + 2 + 3 + \cdots + k) \tag{5}$$

is

25. The number of all 3×3 matrices A, with entries from the set $\{-1, 0, 1\}$, such that the sum of the diagonal elements of $(AA^{\top})$ is 3, is