2021-Sep-1-S1

EE24BTECH11001 - ADITYA TRIPATHY

16. Let $P_1, P_2 \ldots P_15$ be 15 points on a circle. The number of distinct triangles formed by points P_i, P_j, P_k such that $i + j + k \neq 0$ is : $(2021 - Sep - 1 - S1)$

a) 12 b) 419 c) 443 d) 455

17. The range of the function

$$f(x) = \log_{\sqrt{3}}\left(3 + \cos\left(\frac{3\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) + \cos\left(\frac{3\pi}{4} - x\right)\right) \tag{1}$$

is : $(2021 - Sep - 1 - S1)$

a) $\left(0, \sqrt{5}\right)$ b) $[-2, 2]$ c) $\left[\frac{1}{\sqrt{5}}, \sqrt{5}\right]$ d) $[0, 2]$

18. Let $a_1, a_2 \ldots a_{21}$ be an AP such that

$$\sum_{n=1}^{20} \frac{1}{a_n a_{n+1}} = \frac{4}{9} \tag{2}$$

. If the sum of the AP is 189, then $a_6 a_{16}$ is : $(2021 - Sep - 1 - S1)$

a) 57 b) 72

c) 48 d) 36

19. The function $f(x)$, that satisfies the condition

$$f(x) = x + \int_0^{\frac{\pi}{2}} \sin x \cos y f(y)\, dy \tag{3}$$

is : $(2021 - Sep - 1 - S1)$

a) $x + \frac{2}{3}(\pi - 2)\sin x$ b) $x + (\pi + 2)\sin x$ c) $x + \frac{\pi}{2}\sin x$ d) $x + (\pi - 2)\sin x$

20. Let θ be the acute angle between the tangents to the ellipse

$$\frac{x^2}{9} + \frac{y^2}{1} = 1 \tag{4}$$

and the circle

$$x^2 + y^2 = 3 \tag{5}$$

at their point of intersection in the first quadrant. Then $\tan\theta$ is equal to : $(2021 - Sep - 1 - S1)$

a) $\frac{5}{2\sqrt{2}}$
b) $\frac{2}{\sqrt{3}}$
c) $\frac{4}{\sqrt{3}}$
d) 2

X	-2	-1	3	4	6
$\Pr X = x$	$\frac{1}{5}$	a	$\frac{1}{3}$	$\frac{1}{5}$	b

21. Let X be the random variable with distribution : If the mean of X is 2.3 and the variance of X is σ^2 then $100\sigma^2$ is equal to: $(2021 - Sep - 1 - S1)$

22. Let

$$f(x) = x^6 + 2x^4 + x^3 + 2x + 3, x \in \mathbf{R}. \tag{6}$$

Then the natural number n for which $lim_{x\to 1}\frac{x^n f(1)-f(x)}{x-1} = 44$ is : $(2021 - Sep - 1 - S1)$

23. If for the complex number z satisfying $|z - 2 - 2i| \leq 1$, the maximum value of $|3iz + 6|$ is attained at $a + ib$, then $a + b$ is equal to $(2021 - Sep - 1 - S1)$

24. 4. Let the points of intersections of the lines $x-y+1 = 0, x-2y+3 = 0$ and $2x-5y+11 = 0$ are the mid points of the sides of a triangle ABC. Then the area of the triangle ABC is : $(2021 - Sep - 1 - S1)$

25. Let $f(x)$ be a polynomial of degree 3 such that $f(k) = -\frac{2}{k}$ for $k = 2, 3, 4, 5$. Then the value of $53 - 10f(10)$ is : $(2021 - Sep - 1 - S1)$

26. All of the arrangements, with or without meaning, of the word FARMER ae written excluding any word that has two R appering together . The arrangements are listed serially in the alphabetic order as in the English dictionary. Then the serial number of the word FARMER in this list is: $(2021 - Sep - 1 - S1)$

27. If the sum of the coefficients in the expansion of $(x + y)^n$ is 4096, then the greatest coefficient in the expansion is : $(2021 - Sep - 1 - S1)$

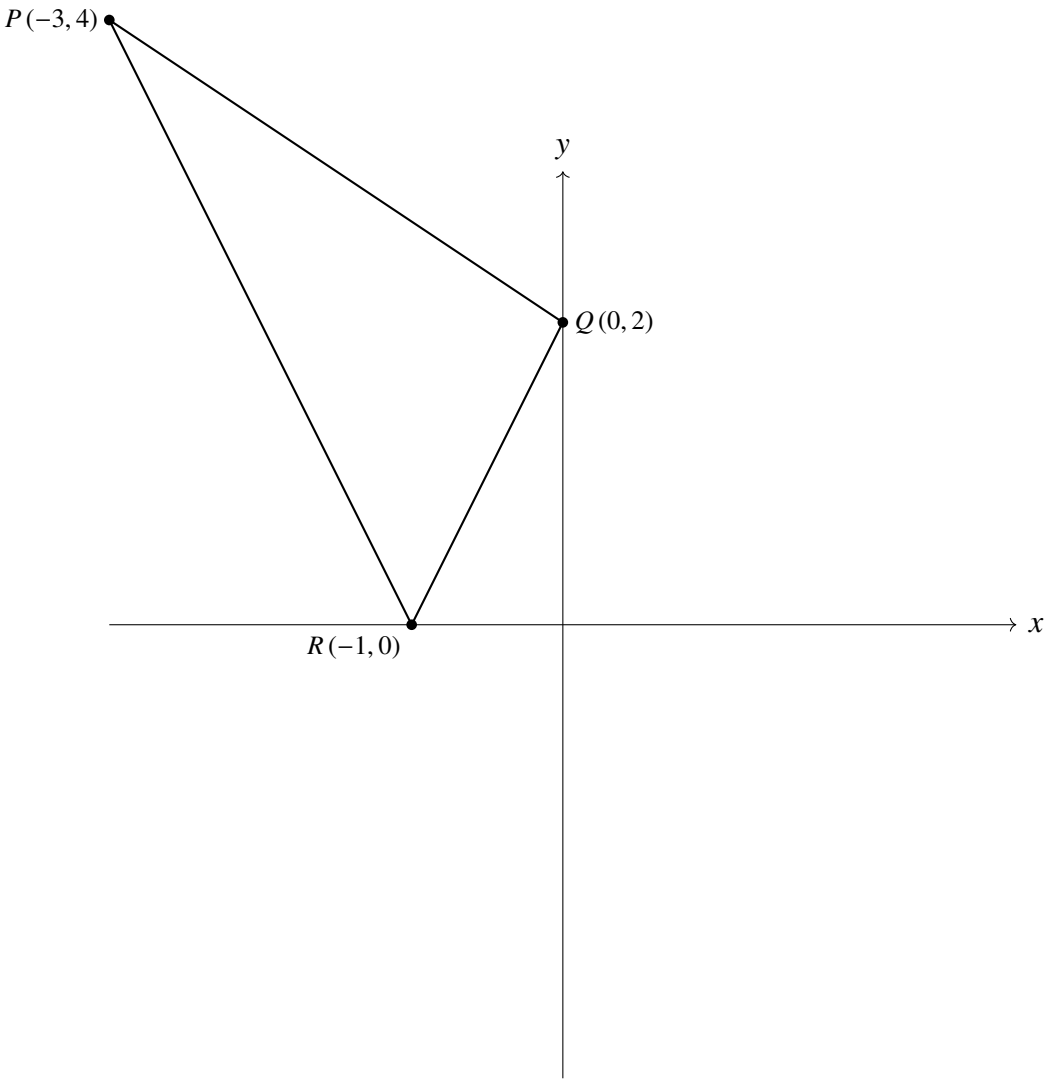
28. If $\mathbf{a} = 2\mathbf{i} - \mathbf{j} + 2\mathbf{k}$ and $\mathbf{b} = \mathbf{i} + 2\mathbf{j} - 1\mathbf{k}$. Let a vector $\mathbf{v}$ be in the plane containing $\mathbf{a}$ and $\mathbf{b}$. If $\mathbf{v}$ is perpendicular to the vector $3\mathbf{i} + 2\mathbf{j} - \mathbf{k}$ and its projection on $\mathbf{a}$ is 19 units, then $\|2\mathbf{v}\|^2$ is equl to : $(2021 - Sep - 1 - S1)$

29. Let $[t]$ denote the greatest integer $\leq t$. The number of points where the function

$$f(x) = [x]\left|x^2 - 1\right| + \sin\left(\frac{\pi}{[x] + 3}\right) - [x + 1], x \in (-2, 2) \tag{7}$$

is not continuous is : $(2021 - Sep - 1 - S1)$

30. A man starts walking from the point $P(-3, 4)$, touches the x-axis at R, and then turns to reach at the point $Q(0, 2)$. The man is walking at a constant speed. If the man reaches the point Q in the minimum time, then $50\left((PR)^2 + (RQ)^2\right)$ $(2021 - Sep - 1 - S1)$


P (−3, 4)
y
Q (0, 2)
x
R (−1, 0)