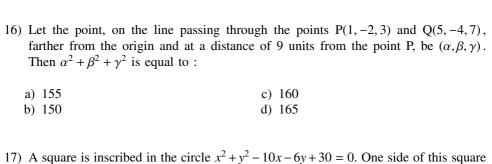
JEE Mains PYQ 04/04/2024 Shift-1

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- is parallel to y = x + 3. If (x_i, y_i) are the vertices of the square, then $\sum (x_i^2 + y_i^2)$ is equal to:
 - a) 148

c) 160

b) 156

- d) 152
- 18) If the domain of the function $\sin^{-1}\left(\frac{3x-22}{2x-19}\right) + \log_e\left(\frac{3x^2-8x+5}{x^2-3x-10}\right)$ is $(\alpha,\beta]$ then $3\alpha + 10\beta$ is equal to:
 - a) 97

c) 95

b) 100

- d) 98
- 19) Let $f(x) = x^5 + 2e^{\frac{x}{4}}$ for all $x \in R$. Consider function g(x) such that $(g \circ f)(x) = x$ for all $x \in R$. Then the value of 8g'(2) is:
 - a) 16

c) 8

b) 4

- d) 2
- 20) Let $\alpha \in (0, \infty)$ and $A = \begin{bmatrix} 1 & 2 & \alpha \\ 1 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix}$. If $\det(adj(2A A^T) . adj(A 2A^T)) = 2^8$, then $(det(A))^2$ is equal to:
 - a) 1

c) 16

b) 49

d) 36

- 21) If $\lim_{x\to 1} \frac{(5x+1)^{\frac{1}{3}}-(x+5)^{\frac{1}{3}}}{(2x+3)^{\frac{1}{2}}-(x+4)^{\frac{1}{2}}} = \frac{m\sqrt{5}}{n(2n)^{\frac{2}{3}}}$, where gcd(m,n) = 1, then 8m + 12n is equal to.
- 22) In a survey of 220 students of a higher secondary school, it was found that at least 125 and at most 130 students studied Mathematics; at least 85 and at most 95 studied Physics; at least 75 and at most 90 studied Chemistry; 30 studied both Physics and Chemistry; 50 studied both Chemistry and Mathematics; 40 studied both Mathematics and Physics and 10 studied none of these subjects. Let m and n respectively be the least and the most number of students who studied all the three subjects. Then m+n is equal to
- 23) Let the solution y = y(x) of the differential equaion $\frac{dy}{dx} y = 1 + 4\sin x$ satisfy $y(\pi) = 1$. Then $y(\frac{\pi}{2} + 10)$ is equal to.
- 24) If the shortest distance between the lines $\frac{x+2}{2} = \frac{y+3}{3} = \frac{z-5}{4}$ and $\frac{x-3}{1} = \frac{y-2}{-3} = \frac{z+4}{2}$ is $\frac{38}{3\sqrt{5}}k$ and $\int_0^k \left[x^2\right]dx = \alpha \sqrt{\alpha}$, where [x] denotes the greatest integer function, then $6\alpha^3$ is equal to.
- 25) Let A be a square matrix of order 2 such that |A| = 2 and the sum of its diagonal elements is -3. If the point(x, y) satisfying $A^2 + xA + yI = 0$ lie on a hyperbola, whose transverse axis is parallel to the x-axis, eccentricity is e and the length of the latus rectum is 1,then $e^4 + l^4$ is equal to.
- 26) let $a = 1 + \frac{{}^{2}C_{2}}{3!} + \frac{{}^{3}C_{2}}{4!} + \frac{{}^{4}C_{2}}{5!} + \cdots$, $b = 1 + \frac{{}^{1}C_{0} + {}^{1}C_{1}}{1!} + \frac{{}^{2}C_{0} + {}^{2}C_{1} + {}^{2}C_{2}}{2!} + \frac{{}^{3}C_{0} + {}^{3}C_{1} + {}^{3}C_{2} + {}^{3}C_{3}}{3!} + \cdots$ Then $\frac{2b}{a^{2}}$ is equal to .
- 27) Let A be a 3×3 matrix of non-negative real elements such that $A \cdot \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = 3 \cdot \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ Then the maximum value of det(A) is.
- 28) Let the length of the focal chord PQ of the parabola $y^2 = 12x$ be 15 units. If the distance of PQ from the origin is p, then $10p^2$ is equal to.
- 29) Let ABC be a triangle of area $15\sqrt{2}$ and the vectors $\overrightarrow{AB} = \hat{i} + 2\hat{j} 7\hat{k}$, $\overrightarrow{BC} = a\hat{i} + b\hat{j} + c\hat{k}$ and $\overrightarrow{AC} = 6\hat{i} + d\hat{j} 2\hat{k}$, d > 0. Then The square of the length of the largest side of the triangle ABC is .
- 30) If $\int_0^{\frac{\pi}{4}} \frac{\sin^2 x}{1 + \sin x \cos x} dx = \frac{1}{a} \log_e\left(\frac{a}{3}\right) + \frac{\pi}{b\sqrt{3}}$, where $a, b \in \mathbb{N}$, then a + b is equal to.