MATHS

BOOKS - JEE MAINS PREVIOUS YEAR ENGLISH

APPLICATION OF DERIVATIVES

Others

1. If p and q are positive real numbers such that $p^2 + q^2 = 1$, then the maximum value of

$(p+q)$ is (1) 2 (2) 1/2 (3) $\frac{1}{\sqrt{2}}$ (4) $\sqrt{2}$

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2. The function $f(x) = tan^{-1}(\sin x + \cos x)$ is an increasing function in (1) $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$ (2) $\left(-\frac{\pi}{2}, \frac{\pi}{4}\right)$ (3) $\left(0, \frac{\pi}{2}\right)$ (4) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

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3. How many real solutions does the equation $x^7 + 14x^5 + 16x^3 + 30x - 560 = 0$ have? (1)

7 (2) 1 (3) 3 (4) 5

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4. Let $f: R \to R$ be defined by $f(x) = \begin{cases} k - 2x & \text{if } x \leq -1 \\ 2x + 3 & \text{if } x > -1 \end{cases}$. If f has a local minimum at $x = 1$, then a possible value of k is (1) 0 (2) $-\frac{1}{2}$ (3) -1 (4) 1

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5. The equation of the tangent to the curve $y = x + \frac{4}{x^2}$, that is parallel to the x-axis, is

(1) $y = 1$ (2) $y = 2$ (3) $y = 3$ (4) $y = 0$

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6. The shortest distance between line $y\text{-}x = 1$ and curve $x = y^2$ is : (1) $\frac{\sqrt{3}}{4}$ (2) $\frac{3\sqrt{2}}{8}$ (3) $\frac{8}{3\sqrt{2}}$ (4) $\frac{4}{\sqrt{3}}$

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7. A spherical balloon is filled with 4500pie cubic meters of helium gas. If a leak in the balloon causes the gas to escape at the rate of 72π cubic meters per minute, then the rate (in meters per minute) at which the radius of the balloon decreases 49 minutes after the leakage began is (1) $\frac{9}{7}$ (2) $\frac{7}{9}$ (3) $\frac{2}{9}$ (4) $\frac{9}{2}$

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8. The intercepts on x-axis made by tangents to the curve, $y = \int_0^x |t| dt, x \in R,$ which are parallel to the line $y = 2x$, are equal to (1) ± 2 (2) ± 3 (3) ± 4 (4) ± 1

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9. If f and g are differentiable functions in [0, 1] satisfying $f(0) = 2 = g(1), g(0) = 0$ and $f(1) = 6$, then for some $c \in]0, 1[$ (1) $2f'(c) = g'(c)$ (2) $2f'(c) = 3g'(c)$ (3) $f'(c) = g'(c)$ (4) $f'(c) = 2g'(c)$

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10. A bird is sitting on the top of a vertical pole 20 m high and its elevation from a point O on the ground is $45o$. It flies off horizontally straight away from the point O. After one second, the elevation of the bird from O is reduced to $30o$. Then the speed (in m/s) of the bird is (1) $40\left(\sqrt{2}-1\right)$ (2) $40\left(\sqrt{3}-2\right)$ (3) $20\sqrt{2}$ (4) $20\left(\sqrt{3}-1\right)$

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11. A wire of length 2 units is cut into two parts which are bent respectively to form a square of $side = x$ units and a circle of $radius = r$ units. If the sum of the areas of the square and the circle so formed is minimum, then : (1) $2x = (\pi + 4)r$ (2) $(\pi + 4)x = \pi r$ (3) $x = 2r$ (4) $2x = r$

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12. The radius of a circle, having minimum area, which touches the curve $y = 4 - x^2$ and the lines $y = |x|$ is : $4(\sqrt{2} - 1)$ (2) $4(\sqrt{2} + 1)$ (3) $2(\sqrt{2} + 1)$ (4) $2(\sqrt{2} - 1)$

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13. Twenty metres of wire is available for fencing off a flower-bed in the form of a circular sector. Then the maximum area (in

$sq\dot{m})$ of the flower-bed is: (1) 25 (2) 30 (3) 12.5 (4) 10

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14. The normal to the curve $y(x-2)(x-3)=x+6$ at the point where the curve intersects the y-axis , passes through the point : (1) $\left(\frac{1}{2}, -\frac{1}{3}\right)$ (2) $\left(\frac{1}{2}, \frac{1}{3}\right)$ (3) $\left(-\frac{1}{2}, -\frac{1}{2}\right)$ (4) $\left(\frac{1}{2}, \frac{1}{2}\right)$

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