JEE ADVANCED MATHS SOLUTIONS

YEAR 2012

Ques No.	Question
1	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** If $\lim_{x \to \infty} \left(\frac{x^2+x+1}{x+1} - ax - b \right) = 4$ then a= b= Watch Free Video Solution on Doubtnut
2	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** Let $P = [a_{ij}]$ be a 3×3 matrix and let $Q = [b_{ij}], where b_{ij} = 2^{i+j} a_{ij} f \text{ or } 1 \leq i, j \leq 3.$ If the determinant of P is 2, then the determinant of the matrix Q is 2^{10} b. 2^{11} c. 2^{12} d. 2^{13} Watch Free Video Solution on Doubtnut
3	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** The locus of the mid-point of the chord of contact of tangents drawn from points lying on the straight line $4x - 5y = 20$ to the circle $x^2 + y^2 = 9$ is: Watch Free Video Solution on Doubtnut
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The total number of ways in which 5 balls of differert colours can be distributed among 3 persons so thai each person gets at least one ball is

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The integral

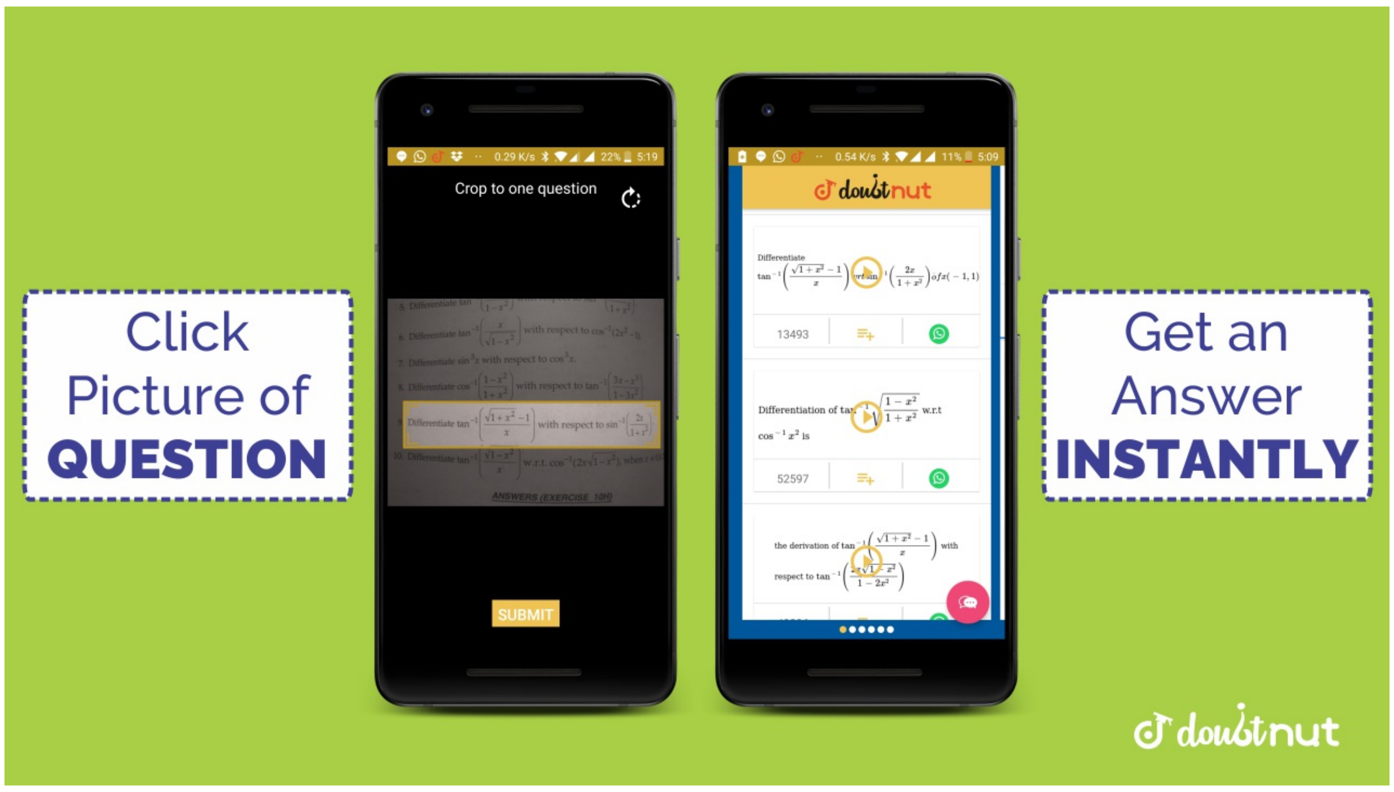
$$\int \frac{\sec^2 x}{(\sec x + \tan x)^{\frac{9}{2}}} dx$$

equals (for some arbitrary constant K).

$$-\frac{1}{(\sec x + \tan x)^{\frac{11}{2}}}\left\{\frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2\right\} + K$$

$$\frac{1}{(\sec x + \tan x)^{\frac{1}{11}}}\left\{\frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2\right\} + K$$

$$-\frac{1}{(\sec x + \tan x)^{\frac{11}{2}}}\left\{\frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2\right\} + K$$

	$\frac{1}{(\sec x+\tan x)^{\frac{11}{2}}}\left\{\frac{1}{11}+\frac{1}{7}(\sec x+\tan x)^2\right\}+K$ Watch Free Video Solution on Doubtnut
6	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** The point p is the intersection of the straight line joining the points $Q(2,3,5)$ and $R(1,-1,4)$ with the plane $5x-4y-z=1$. If S is the foot of the perpendicular drawn from the point $T(2,1,4)$ to QR, then the length of the line segment PS is: Watch Free Video Solution on Doubtnut
7	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** Let z be a complex number such that the imaginary part of z is nonzero and $a=z^2+z+1$ is real. Then a cannot take the value Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	

8	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** The ellipse $E_1 : \frac{x^2}{9} + \frac{y^2}{4} = 1$ is inscribed in a rectangle R whose sides are parallel to the coordinate axes. Another ellipse E_2 passing through the point (0, 4) circumscribes the rectangle R. The eccentricity of the ellipse E_2 is $\frac{\sqrt{2}}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$ Watch Free Video Solution on Doubtnut
9	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** The function $f : [0, 3]\overrightarrow{1, 29}$, defined by $f(x) = 2x^3 - 15x^2$ $+ 36x + 1,$ is one-one and onto onto but not one-one one-one but not onto neither one-one nor onto Watch Free Video Solution on Doubtnut
10	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallel to the sraight line $2x - y = 1$. The points of contact of the tangents on the hyperbola are Watch Free Video Solution on Doubtnut
11	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** If $y(x)$ satisfies the differential equation $y' - y \tan x$ $= 2x secx$ and $y(0) = 0$, then Watch Free Video Solution on Doubtnut
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A ship is fitted with three engines E_1, E_2, and E_3,. The engines function independently of each other with respective probabilities $\frac{1}{2}$. $\frac{1}{4}$and $\frac{1}{4}$,and For the ship to be operational at least two of its engines must function. Let X denote the event that the ship is operational and let X_1, X_2, and X_3 denote respectively the events that the engines E_1, E_2 and E_3,are functioning. Which of the following is (are) true?

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Let S be the area of the region enclosed by
$y = e^{-x^2}, y = 0, x$
$= 0, andx = 1.$
Then (a)$S \geq \frac{1}{e}$ (b) $S \geq 1 = \frac{1}{e}$ $S \leq \frac{1}{4}\left(1 + \frac{1}{\sqrt{e}}\right)$ (d)
$S \leq \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{e}}\Bigg(1$
$- \frac{1}{\sqrt{2}}\Bigg)$

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Let $IR\overrightarrow{I}R$ be defined as
$f(x) = |x|$
$+ \left|x^2 - 1\right|.$
The total number of points at which f attains either a local maximum or a local minimum is________

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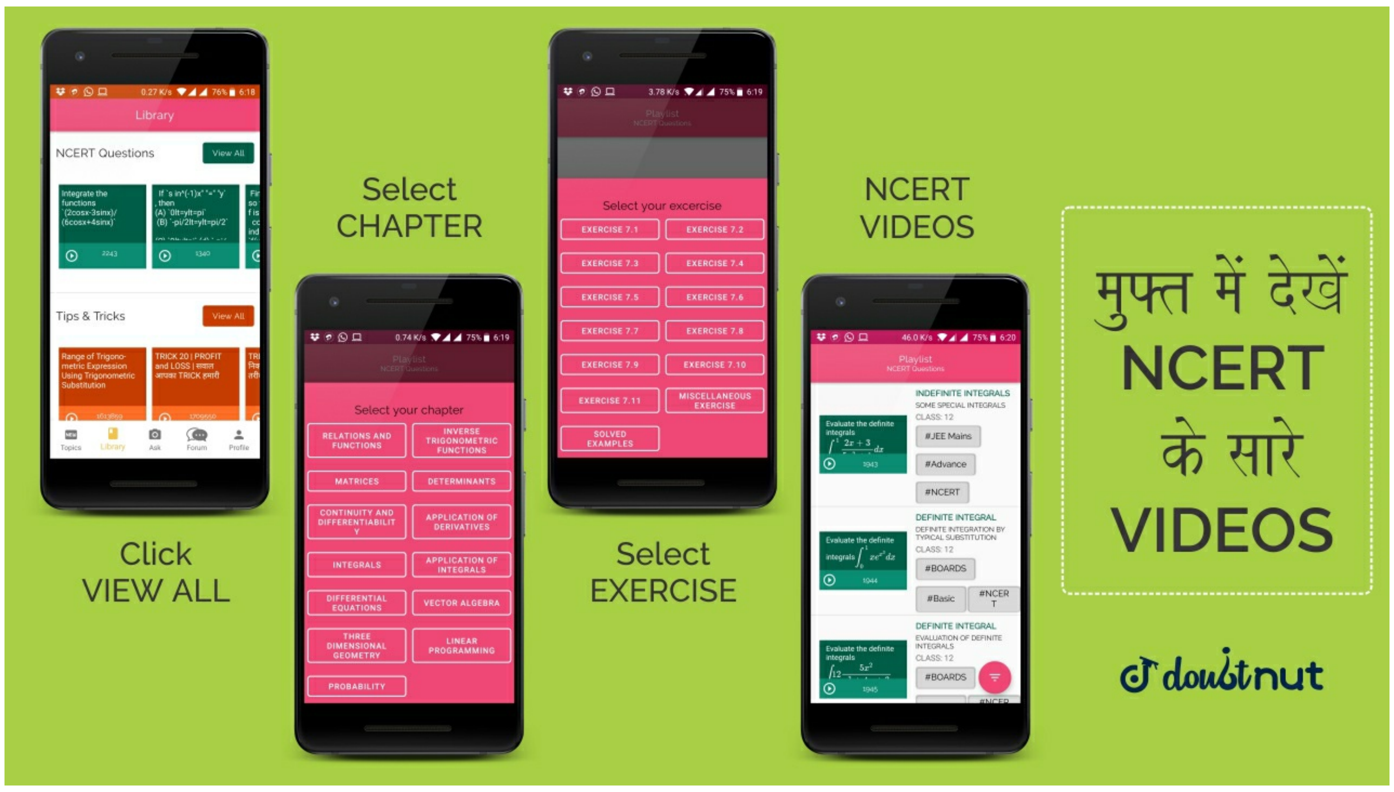
15	Let S be the focus of the parabola $y^2 = 8x$ and let PQ be the common chord of the circle $x^2 + y^2 - 2x - 4y = 0$ and the given parabola. The area of the triangle PQS is - Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
16	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** Let $p(x)$ be a real polynomial of least degree which has a local maximum at $x = 1$ and a local minimum at $x = 3$. If $p(1) = 6andp(3) = 2$, then $p'(0)$ is_____ Watch Free Video Solution on Doubtnut
17	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 1** The value of

	$6+(\log)_{\frac{3}{2}}\left[\frac{1}{3\sqrt{2}}\right.$ $\cdot\sqrt{\left(4-\frac{1}{3\sqrt{2}}\right)\sqrt{4-\frac{1}{3\sqrt{2}}\ldots\ldots}}$ is .... Watch Free Video Solution on Doubtnut
18	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** The value of the integral $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\left(x^2+\ln\left(\frac{\pi+x}{\pi-x}\right)\right)\cos x$ dx is Watch Free Video Solution on Doubtnut
19	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** Let $a_1, a_2, a_3, \ldots$ be in harmonic progression with $a_1=5anda_{20}=25.$ The least positive integer n for which $a_n<0$ 22 b. 23 c. 24 d. 25 Watch Free Video Solution on Doubtnut

20	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** The equation of a plane passing through the line of intersection of the planes $x+2y+3z=2$ and $x-y+z=3$ and at a distance $\frac{2}{\sqrt{3}}$ from the point $(3, 1, -1)$ is Watch Free Video Solution on Doubtnut
21	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** Let PQR be a triangle of area Δ with a = 2, b = 7/2 and c =5/2, where a, b and c are the lengths of the sides of the triangle opposite to the angles at P, Q and R respectively. Then find the value of $\frac{2\sin P-\sin 2P}{2\sin P+\sin 2P}$ Watch Free Video Solution on Doubtnut
22	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** If $\vec{a}$ and $\vec{b}$ are vectors such that $\left\|\vec{\text{a}}+\vec{b}\right\|$ = $\sqrt{29}$ and $\vec{\text{ä}}\, x\left(2\hat{\imath}+3\hat{j}+4\hat{k}\right)$ = $\left(2\hat{\imath}+3\hat{j}+4\hat{k}\right)x\hat{b}$, then a possible value of $\left(\vec{a}+\vec{b}\right)$. $\left(-7\hat{\imath}+2\hat{j}+\hat{3}k\right)$ is Watch Free Video Solution on Doubtnut
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If P is a 3×3 matrix such that $P^T = 2P + I$, where P^T is the transpose of P and I is the 3×3 identity matrix, then there exists a column matrix, $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \neq \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$ such that

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let $\alpha(a)$ and $\beta(a)$ be the roots of the equation

$$\left((1+a)^{\frac{1}{3}} - 1\right)x^2 + \left((1+a)^{\frac{1}{2}} - 1\right)x + \left((1+a)^{\frac{1}{6}} - 1\right) = 0$$

where $a > -1$ then, $\lim_{a \to 0^+} \alpha(a)$ and $\lim_{a \to 0^+} \beta(a)$

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four fair dice D_1, D_2, D_3 and D_4 each having six faces numbered 1,2,3,4,5 and 6 are rolled simultaneously. The probability that D_4 shows a number appearing on one of D_1, D_2, D_3 is

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Let

$$f(x) = (1-x)^2 \sin^2 x + x^2$$

for all $x \in IR$, and let

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$g(x) = \int_1^x \left(\frac{2(t-1)}{t-1} - \ln t \right) f(t)$ dt for all $x, \in (1, \infty)$. Consider the statements: P: There exists some $x \in IR$ such that $f(x) + 2x = 2(1 + x^2)$
Q: There exists some $x \in IR$ such that $2f(x) + 1 = 2x(1 + x)$
Then

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JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2

Let $f(x) = (1-x)^2 \sin^2 x + x^2$

for all $x \in IR$, and let $g(x) = \int_1^x \left(\frac{2(t-1)}{t-1} - \ln t \right) f(t)$ dt for all $x, \in (1, \infty)$. Which of the following is true?

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28	A tangent PT is drawn to the circle $x^2 + y^2 = 4$ at the point P($\sqrt{3}$,1). A straight line L is perpendicular to PT is a tangent to the circle $(x-3)^2 + y^2 = 1$ Common tangent of two circle is: Watch Free Video Solution on Doubtnut
29	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** A tangent PT is drawn to the circle $x^2 + y^2 = 4$ at point $p(\sqrt{3}, 1)$ A straight line L perpendicular to PT is a tangent to the circle $(x-3)^2 + y^2 = 1$ A possible equation of L is Watch Free Video Solution on Doubtnut
30	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** Let n denote the number of all n-digit positive integers formed by the digits $0, 1$ or both such that no consecutive digits in them are 0. Let b_n = the number of such n-digit integers ending with digit 1 and c_n= the number of such n-digit integers ending with digit 0. The value of b_6, is Watch Free Video Solution on Doubtnut
31	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** If the straight lines $\frac{x-1}{2} = \frac{y+1}{k} = \frac{z}{2}$ and $\frac{x+1}{5} = \frac{y+1}{2} = \frac{z}{k}$ are coplanar, then the plane(s) containing these two lines is (are) Watch Free Video Solution on Doubtnut

32	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** If the adjoint of a 3×3 matrix P is $\begin{bmatrix} 1 & 4 & 4 \\ 2 & 1 & 7 \\ 1 & 1 & 3 \end{bmatrix}$, then the possible value(s) of the determinant of P is (are) Watch Free Video Solution on Doubtnut
33	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** Let $f:(-1,1) \rightarrow R$ be such that $f(\cos 4\theta) = \frac{2}{2-\sec^2\theta}$ for $\theta \in \left(0, \frac{\pi}{4}\right) \cup \left(\frac{\pi}{4}, \frac{\pi}{2}\right)$. Then the value(s) of $f\left(\frac{1}{3}\right)$ is/are Watch Free Video Solution on Doubtnut
34	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** Let $XandY$ be two events that $P(X) = \frac{1}{3}, P(X\|Y) = \frac{1}{2} andP(Y\|X) = \frac{2}{5}$ then: $P(Y) = \frac{4}{15}$ (b) $P(X \cup Y) = \frac{2}{5}$ $P(X'\|Y) = \frac{1}{2}$ (d) $P(X \cap Y) = \frac{1}{5}$ Watch Free Video Solution on Doubtnut
35	**JEE ADVANCED MATHS SOLUTIONS - 2012 || Paper 2** . If $f(x) = \int_0^x e^{t^2}(t-2)(t-3)$ dtfor all $x \in (0, \infty)$, then (a)f has a local maximum at x=2. (b)f is decreasing on (2,3) (c)There exists some $c\varepsilon(0, \infty)$ such that f''(c)=0 (d) f has a local minimum at x=3 Watch Free Video Solution on Doubtnut

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Q. For every integer n, let an and bn be real numbers. Let function $f: R \rightarrow R$ be given by a

$f(x)$

$= \{a_n + \sin \pi x,$

f or $x \in [2n, 2n$

$+ 1]$

,

$\_\ n + \cos \pi x,$

f or $x \in (2n + 1,$

$2n)$

for all integers n.

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