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JEE MAINS MATHS SOLUTIONS

YEAR 2013

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Ques No.	Question
1	**JEE MAINS MATHS SOLUTIONS - 2013** The circle passing through (1, -2) and touching the axis of x at (3, 0) also passes through the point (1) (2, -5) (2) (5, -2) (3) (-2, 5) (4) (-5, 2) Watch Free Video Solution on Doubtnut
2	**JEE MAINS MATHS SOLUTIONS - 2013** ABCD is a trapezium such that AB and CD are parallel and $BC \perp CD$. If $\angle ADB = \theta, BC = p and CD = q$, then AB is equal to (1) $\frac{p^2 + q^2 \cos\theta}{p\cos\theta + q\sin\theta}$ (2) $\frac{p^2 + q^2}{p^2\cos\theta + q^2\sin\theta}$ (3) $\frac{\left(p^2 + q^2\right)\sin\theta}{\left(p\cos\theta + q\sin\theta\right)^2}$ (4) $\frac{\left(p^2 + q^2\right)\sin\theta}{p\cos\theta + q\sin\theta}$ Watch Free Video Solution on Doubtnut
3	**JEE MAINS MATHS SOLUTIONS - 2013** Given : A circle, $2x^2 + 2y^2 = 5$ and a parabola, $y^2 = 4\sqrt{5}x$. Statement - I : An equation of a common tangent to these curves is $y = x+\sqrt{5}$ Statement - II : If the line, $y = mx + \frac{\sqrt{5}}{m}(m \neq 0)$ is their common tangent, then m satisfies $m^4 - 3m^2 + 2 = 0$. (1) Statement - I is True; Statement -II is true; Statement-II is not a correct explanation for Statement-I (2) Statement -I is True; Statement -II is False. (3) Statement -I is False; Statement -II is True (4) Statement -I is True; Statement -II is True; Statement-II is a correct explanation for Statement-I Watch Free Video Solution on Doubtnut

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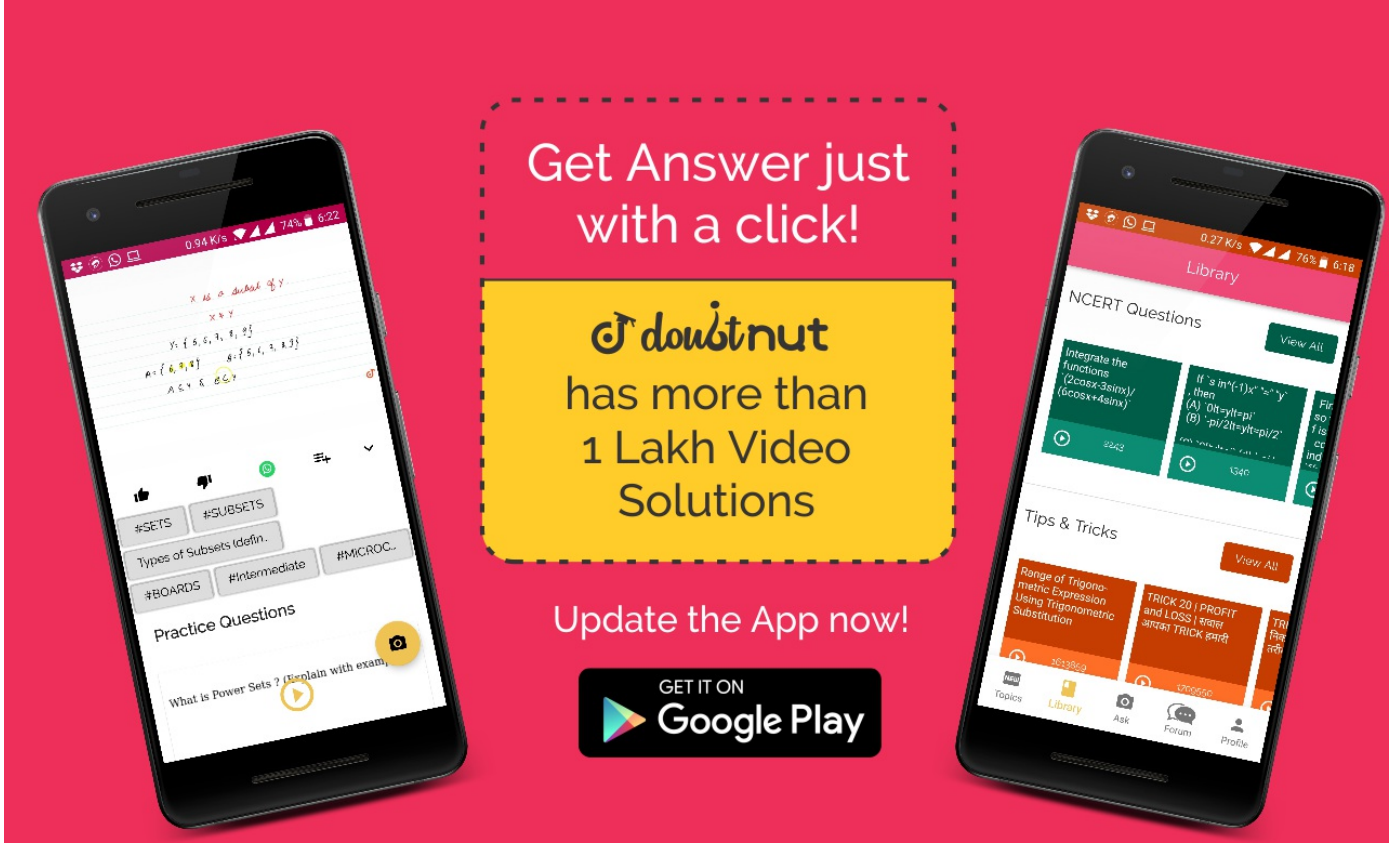

4	**JEE MAINS MATHS SOLUTIONS - 2013** A ray of light along $x + \sqrt{3}y = \sqrt{3}$ gets reflected upon reaching x-axis, the equation of the reflected rays is (1) $\sqrt{3}y = x - \sqrt{3}$ (2) $y = \sqrt{3}x - \sqrt{3}$ (3) $\sqrt{3}y = x - 1$ (4) $y = x + \sqrt{3}$ Watch Free Video Solution on Doubtnut
5	**JEE MAINS MATHS SOLUTIONS - 2013** All the students of a class performed poorly in Mathematics. The teacher decided to give grace marks of 10 to each of the students. Which of the following statistical measures will not change even after the grace marks were given ? (1) median (2) mode (3) variance (4) mean Watch Free Video Solution on Doubtnut
6	**JEE MAINS MATHS SOLUTIONS - 2013** If x, y, z are in A.P. and $tan^{-1}x,$ $tan^{-1}yandtan^{-1}z$ are also in A.P., then (1) $2x = 3y = 6z$ (2) $6x = 3y = 2z$ (3) $6x = 4y = 3z$ (4) $x = y = z$ Watch Free Video Solution on Doubtnut
	JEE MAINS MATHS SOLUTIONS - 2013 If $\int f(x)dx = \psi(x)$, then $\int x^5 f\left(x^3\right)dx$ is equal to (1) $\frac{1}{3}x^3\psi\left(x^3\right) - 3$ $\int x^3\psi\left(x^3\right)dx + C$ (2)

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$\frac{1}{3}x^3\psi\left(x^3\right) - \int x^2\psi\left(x^3\right)dx + C$

(3)

$\frac{1}{3}x^3\psi\left(x^3\right) - \int x^3\psi\left(x^3\right)dx + C$

(4)

$\frac{1}{3}\left[x^3\psi\left(x^3\right) - \int x^2\psi\left(x^3\right)dx\right] + C$

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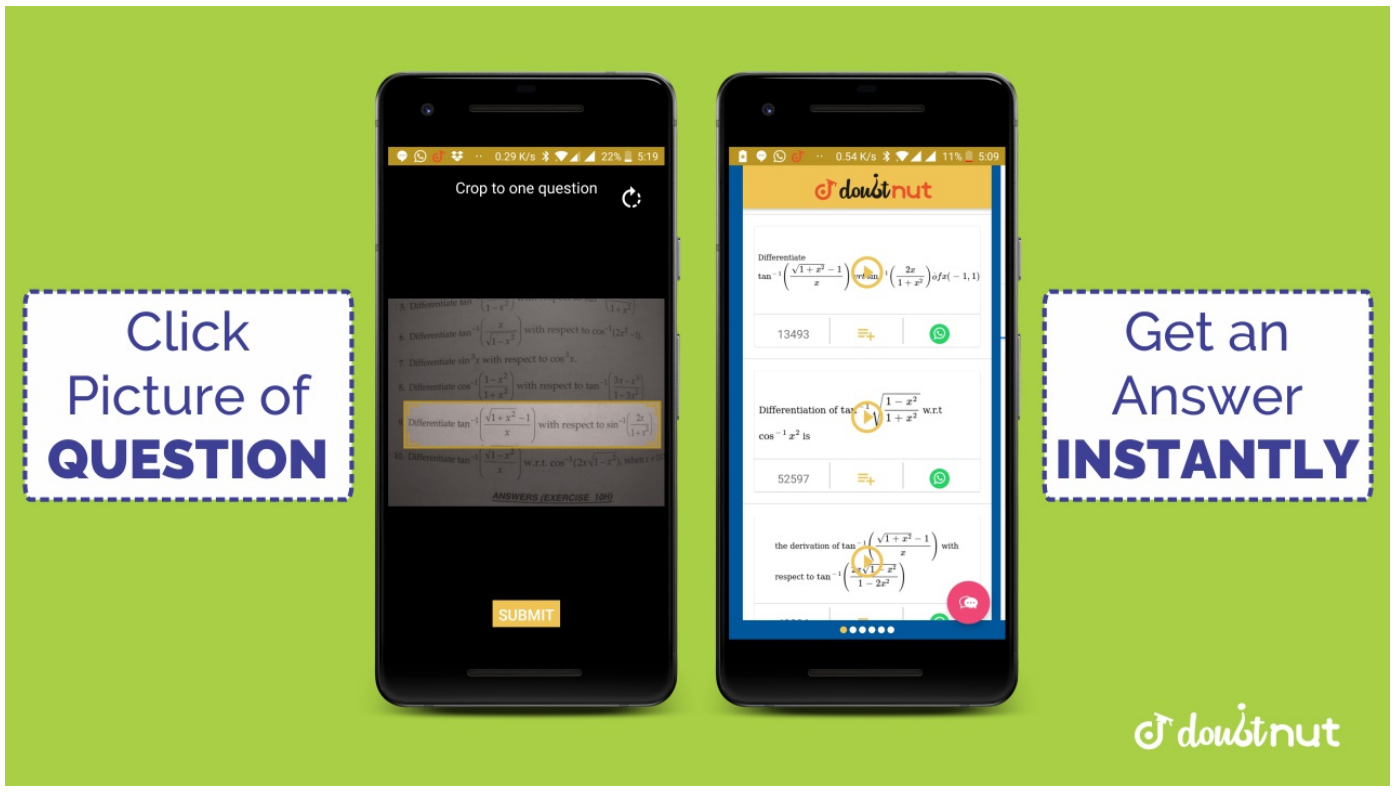

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The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having centre at (0, 3) is (1) $x^2 + y^2 - 6y + 7 = 0$ (2) $x^2 + y^2 - 6y - 5 = 0$ (3) $x^2 + y^2 - 6y + 5 = 0$ (4) $x^2 + y^2 - 6y - 7 = 0$

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The x-coordinate of the incentre of the triangle that has the coordinates of mid points of its sides as (0, 1), (1, 1) and (1, 0) is (1) $2 - \sqrt{2}$ (2) $1 + \sqrt{2}$ (3) $1 - \sqrt{2}$ (4) $2 + \sqrt{2}$

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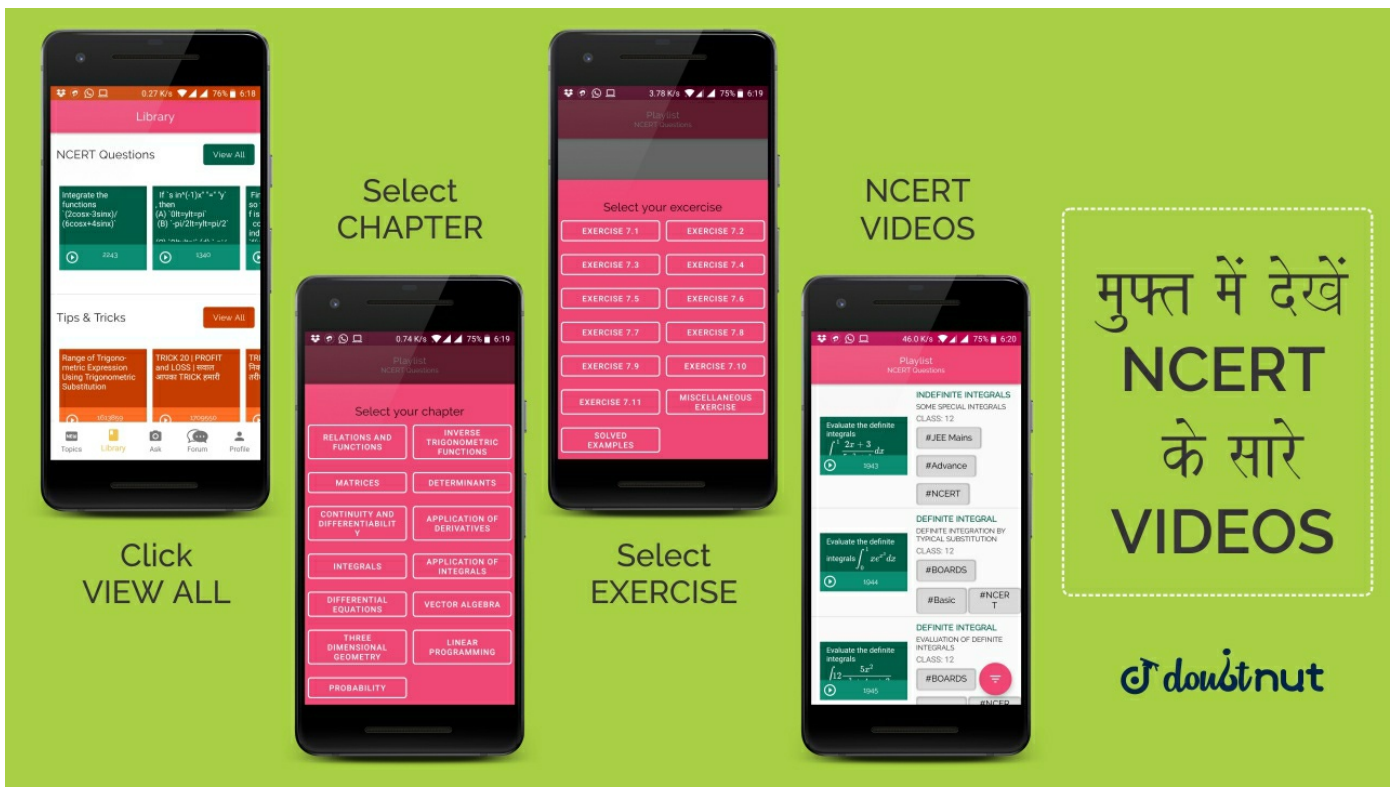
10	The intercepts on x-axis made by tangents to the curve, $y = \int_0^x \|t\|dt, x \in R,$ which are parallel to the line $y = 2x$, are equal to (1) ± 2 (2) ± 3 (3) ± 4 (4) ± 1 Watch Free Video Solution on Doubtnut
11	**JEE MAINS MATHS SOLUTIONS - 2013** The sum of first 20 terms of the sequence 0.7, 0.77, 0.777, .. , is (1) $\frac{7}{9}\left(99 - 10^{-20}\right)$ (2) $\frac{7}{81}\left(179 + 10^{-20}\right)$ (3) $\frac{7}{9}\left(99 + 10^{-20}\right)$ (3) $\frac{7}{81}\left(179 - 10^{-20}\right)$ Watch Free Video Solution on Doubtnut
12	**JEE MAINS MATHS SOLUTIONS - 2013** Consider : Statement I : $\left(p \hat{\sim} q\right) \widehat{\sim p q}$ is a fallacy. Statement II : $\left(p \overrightarrow{q}\right) \leftrightarrow \left(\sim q \overrightarrow{\sim} p\right)$ is a tautology. (1) Statement - I is True; Statement -II is true; Statement-II is not a correct explanation for Statement-I (2) Statement -I is True; Statement -II is False. (3) Statement -I is False; Statement -II is True (4) Statement -I is True; Statement -II is True; Statement-II is a correct explanation for Statement-I Watch Free Video Solution on Doubtnut
13	**JEE MAINS MATHS SOLUTIONS - 2013** The area (in square units) bounded by the curves $y = \sqrt{x}, 2y - x + 3 = 0$, x-axis, and lying in the first quadrant is (1) 36 (2) 18 (3) $\frac{27}{4}$ (4) 9 Watch Free Video Solution on Doubtnut

14	**JEE MAINS MATHS SOLUTIONS - 2013** The expression $\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}$ can be written as (1) $secA\cos ecA+1$ (2) $tanA+\cot A$ (3) $secA+\cos ecA$ (4) $s\in A\cos A+1$ Watch Free Video Solution on Doubtnut
15	**JEE MAINS MATHS SOLUTIONS - 2013** The real number k for which the equation, $2x^3+3x+k=0$ has two distinct real roots in [0, 1] (1) lies between 2 and 3 (2) lies between -1 and 0 (3) does not exist (4) lies between 1 and 2 Watch Free Video Solution on Doubtnut
	
16	**JEE MAINS MATHS SOLUTIONS - 2013** $\left(\lim\right)_{x\to 0}\left((1-\cos 2x)\frac{3+\cos x}{x\tan 4x}\right)$

	is equal to (1) $\frac{1}{2}$ (2) 1 (3) 2 (4) $-\frac{1}{4}$ Watch Free Video Solution on Doubtnut
17	**JEE MAINS MATHS SOLUTIONS - 2013** Let T_n be the number of all possible triangles formed by joining vertices of an n-sided regular polygon. If $T_{n+1} - T_n = 10$, then the value of n is (1) 5 (2) 10 (3) 8 (4) 7 Watch Free Video Solution on Doubtnut
18	**JEE MAINS MATHS SOLUTIONS - 2013** At present, a firm is manufacturing 2000 items. It is estimated that the rate of change of production P w.r.t. additional number of workers x is given by $\frac{dP}{dx} = 100 - 12\sqrt{x}.$ If the firm employs 25 more workers, then the new level of production of items is (1) 3000 (2) 3500 (3) 4500 (4) 2500 Watch Free Video Solution on Doubtnut
19	**JEE MAINS MATHS SOLUTIONS - 2013** Statement - I : The value of the integral $\int_{\pi/6}^{\pi/3} \frac{dx}{1+\sqrt{\tan x}}$ is equal to $\frac{\pi}{6}$. Statement - II : $\int_a^b f(x)dx =$ $\int_a^b f(a+b-x)dx.$ (1) Statement - I is True; Statement -II is true; Statement-II is not a correct explanation for Statement-I (2) Statement -I is True; Statement -II is False. (3) Statement -I is False; Statement -II is True (4) Statement -I is True; Statement -II is True; Statement-II is a correct explanation for Statement-I Watch Free Video Solution on Doubtnut

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If $P = [1\alpha 3133244]$ is the adjoint of a 3×3 matrix A and $|A| = 4$, then a is equal to (1) 11 (2) 5 (3) 0 (4) 4

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The number of values of k, for which the system of equations $(k+1)x + 8y = 4k$ $kx + (k+3)y = 3k$
-1
has no solution, is (1) 1 (2) 2 (3) 3 (4) infinite

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If $y = sec\left(tan^{-1}x\right)$, then $\frac{dy}{dx}$ at $x = 1$ is equal to (1) $\frac{1}{2}$ (2) 1 (3) $\sqrt{2}$ (4) $\frac{1}{\sqrt{2}}$

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If the lines
$\frac{x-2}{1} = \frac{y-3}{1}$
$= \frac{x-4}{-k}$
and
$\frac{x-1}{k} = \frac{y-4}{2}$
$= \frac{x-5}{1}$
are coplanar, then k can have (1) exactly one value (2) exactly two values (3) exactly three values (4) any value

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Let A and B be two sets containing 2 elements and 4 elements respectively. The number of subsets of $A \times B$ having 3 or more elements is (1) 220 (2) 219 (3) 211 (4) 256

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If the vectors $\overline{A}B = 3\hat{i} + 4\hat{k}$ and $\overline{A}C = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a triangle ABC, then the length of the median through A is (1) $\sqrt{72}$ (2) $\sqrt{33}$ (3) $\sqrt{45}$ (4) $\sqrt{18}$

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A multiple choice examination has 5 questions. Each question has three alternative answers of which exactly one is correct. The probability that a student will get 4 or more correct answers just by guessing is (1) $\frac{13}{3^5}$ (2) $\frac{11}{3^5}$ (3) $\frac{10}{3^5}$ (4) $\frac{17}{3^5}$

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If z is a complex number of unit modulus and argument q, then $arg\left(\frac{1+z}{1+\bar{z}}\right)$ equal (1) $\frac{\pi}{2} - \theta$ (2) θ (3) $\pi - \theta$ (4) $-\theta$

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If the equations $x^2 + 2x + 3 = 0$ and $ax^2 + bx + c = 0, a, b, c \in R$, have a common root, then $a : b : c$ is (1) 3 : 2 : 1 (2) 1 : 3 : 2 (3) 3 : 1 : 2 (4) 1 : 2 : 3

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Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is (1) $\frac{5}{2}$ (2) $\frac{7}{2}$ (3) $\frac{9}{2}$ (4) $\frac{3}{2}$

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The term independent of x in expansion of $\left(\frac{x+1}{x^{\frac{2}{3}} - x^{\frac{1}{3}} + 1} - \frac{x-1}{x - x^{\frac{1}{2}}}\right)$ is (1) 120 (2) 210 (3) 310 (4) 4

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