JEE ADVANCED MATHS SOLUTIONS

YEAR 2013

Ques No.	Question
1	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** Perpendiculars are drawn from points on the line $\frac{x+2}{2} = \frac{y+1}{-1} = \frac{z}{3}$ to the plane x + y + z=3 The feet of perpendiculars lie on the line Watch Free Video Solution on Doubtnut
2	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** For a>b>c>0, the distance between (1,1) and point of intersection of the lines ax + by + c = 0 and bx + ay + c = 0 is less than $2\sqrt{2}$, Then Watch Free Video Solution on Doubtnut
3	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** The area enclosed by the curves $y = \sin x + \cos x \text{ and } y = \lvert\cos x - \sin x\rvert$ over the interval $\left[0, \frac{\pi}{2}\right]$ Watch Free Video Solution on Doubtnut

4	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** Four person independently solve a certain problem correctly with probabilities $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{1}{8}$. Then the probability that he problem is solve correctly by at least one of them is $\frac{235}{256}$ b. $\frac{21}{256}$ c. $\frac{3}{256}$ d. $\frac{253}{256}$ Watch Free Video Solution on Doubtnut
5	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** 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 Watch Free Video Solution on Doubtnut
6	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** Let complex numbers α and $\frac{1}{\alpha}$ lies on circles $(x-x_0)^2$ $+(y-y_0)^2=r^2$ and $(x-x_0)^2$ $+(y-y_0)^2=4r^2$ respectively. If $z_0=x_0+iy_0$ satisfies the equation $2\|z_0\|^2=r^2+2$ then $\|\alpha\|$ is equal to Watch Free Video Solution on Doubtnut
7	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** The number of points in $(-\infty,\infty)$, for which $x^2-x\sin x-\cos x$ $=0,$ is 6 (b) 4 (c) 2 (d) 0

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JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1

Let $f: \left[\frac{1}{2}, 1\right] \rightarrow R$ (the set of all real numbers) be a positive, non-constant, and differentiable function such that
$f'(x)$
$< 2f(x) and f\left(\frac{1}{2}\right)$
$= 1$
. Then the value of $\int_{\frac{1}{2}}^{1} f(x)dx$ lies in the interval (a)$(2e-1, 2e)$ (b) $(3-1, 2e-1)$ (c)$\left(\frac{e-1}{2}, e-1\right)$ (d) $\left(0, \frac{e-1}{2}\right)$

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JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1

Let
$\overrightarrow{P}R = 3\hat{i} + \hat{j}$
$- 2\hat{k} and \overrightarrow{S}Q = \hat{i}$
$- 3\hat{j} - 4\hat{k}$
determine diagonals of a parallelogram
$PQRS, and \overrightarrow{P}T = \hat{i}$
$+ 2\hat{j} + 3\hat{k}$
be another vector. Then the volume of the parallelepiped determine by the vectors $\overrightarrow{P}T$, $\overrightarrow{P}Q$ and $\overrightarrow{P}S$ is 5 b. 20 c. 10 d. 30

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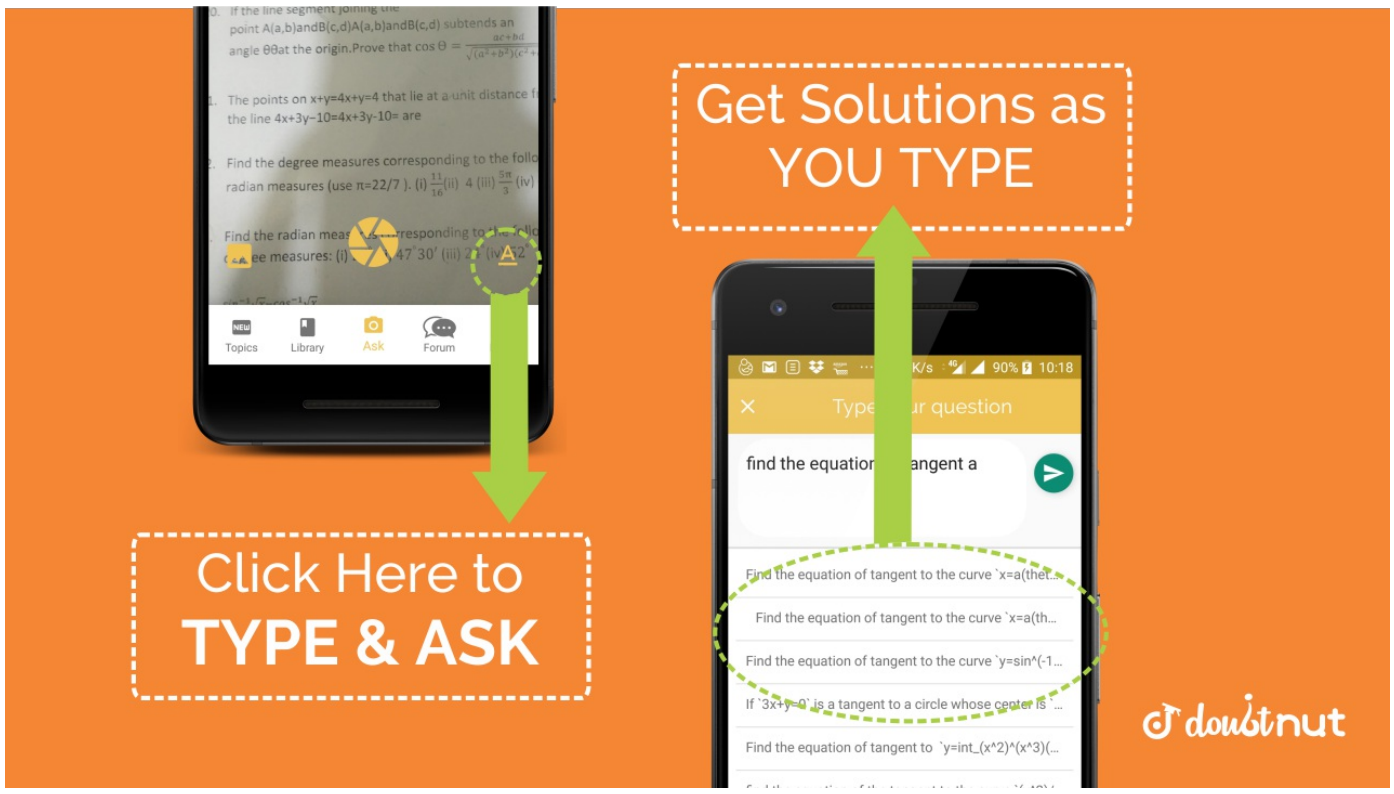
10	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** A curve passes through the point $\left(1, \frac{\pi}{6}\right)$. Let the slope of the curve at each point (x, y) be $\frac{y}{x} + \sec\left(\frac{y}{x}\right), x > 0$ Then the equation of the curve is Watch Free Video Solution on Doubtnut
11	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** Let $f(x) = x \sin \pi x, x > 0$ Then for all natural numbers n, f`(x) vanishes at Watch Free Video Solution on Doubtnut
	
12	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** Let $S_n =$ $\sum_{k=1}^{4n} (-1)\frac{k(k+1)}{2}k^2$ Then S_n can take value (s) 1056 b. 1088 c. 1120 d. 1332 Watch Free Video Solution on Doubtnut
13	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** For 3×3 matrices $MandN,$ which of the following statement (s) is (are) NOT correct ? $N^T MN$ is symmetricor skew-symmetric, according as m is symmetric or skew-symmetric. $MN - NM$ is skew-symmetric for all symmetric matrices $MandN$. MN is symmetric for all symmetric matrices $MandN$

	$(adjM)(adjN)$ $= adj(MN)$ for all invertible matrices $MandN$. Watch Free Video Solution on Doubtnut
14	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** A rectangular sheet of fixed perimeter with sides having their lengths in the ratio $8:15$ is converted into anopen rectangular box by folding after removing squares of equal area from all four corners. If the total area of removed squares is 100, the resulting box has maximum volume. Then the length of the sides of the rectangular sheet are 24 (b) 32 (c) 45 (d) 60 Watch Free Video Solution on Doubtnut
15	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** Consider the set of eight vector $V = \left\{a\hat{i} + b\hat{j} + c\hat{k};\right.$ $\left.a, bc \in \{-1, 1\}\right\}.$ Three non-coplanar vectors can be chosen from V is 2^p ways. Then p is_____. Watch Free Video Solution on Doubtnut
16	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** The coefficients of three consecutive terms of $(1+x)^{n+5}$ are in the ratio 5:10:14. Then $n =$ _____. Watch Free Video Solution on Doubtnut
	JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1 A pack contains n cards numbered from 1 to n . Two consecutive numbered cards are removed from the pack and the sum of the numbers on the remaining cards is

17	1224. If the smaller of het numbers on the removed cards is k, then $k-20=$ _____. Watch Free Video Solution on Doubtnut
18	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** For a>b>c>0, the distance between (1,1) and point of intersection of the lines ax + by + c = 0 and bx + ay + c = 0 is less than$2\sqrt{2}$, Then Watch Free Video Solution on Doubtnut
19	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 1** A vertical line passing through the point $(h,0)$ intersects the ellipse $\frac{x^2}{4}+\frac{y^2}{3}=1$ at the points P and Q.Let the tangents to the ellipse at P and Q meet at R. If $\delta(h)$ Area of triangle δPQR, and $\delta_1 \max_{\frac{1}{2}\le h\le 1} \delta(h)$ A further $\delta_2 \min_{\frac{1}{2}\le h\le 1} \delta(h)$ Then $\frac{8}{\sqrt{5}}\delta_1-8\delta_2$ Watch Free Video Solution on Doubtnut
	JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2

20	For $a \in R$ (the set of all real numbers), $a \neq -1)$, $\left(\lim\right)_{n \to \infty}$ $\left(\begin{array}{l} \dfrac{1^a + 2^a + + n^a}{(n+1)^{a-1}[(na+1)} \\ +(na+2)+... \\ ...(na+n)] \end{array}\right)$ $= \dfrac{1}{60.}$ Then $a =$ (a)5 (b) 7 (c) $\dfrac{-15}{2}$ (d) $\dfrac{-17}{2}$ Watch Free Video Solution on Doubtnut
21	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** Circle(s) touching x-axis at a distance 3 from the origin and having an intercept of length $2\sqrt{7}$ on y-axis is (are) Watch Free Video Solution on Doubtnut
22	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** Circle(s) touching x-axis at a distance 3 from the origin and having an intercept of length $2\sqrt{7}$ on y-axis is (are) Watch Free Video Solution on Doubtnut
23	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** In a triangle PQR, P is the largest angle and $\cos P = \dfrac{1}{3}$. Further the incircle of the triangle touches the sides PQ, QR and RP at N, L and M respectively, such that the lengths of PN, QL and RM are consecutive even integers. Then possible length(s) of the side(s) of the triangle is (are) Watch Free Video Solution on Doubtnut

24	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** Let w = $(\sqrt{3}+i\frac{)}{2}$ and $P=\{w^n: n=1,2,$ $3,\ldots..\},$ Further $H_1=\left\{z\in C\right.$ $:Re(z)>\frac{1}{2}\Big\}$ and $H_2=\left\{z\in c\right.$ $:Re(z)<-\frac{1}{2}\Big\}$ Where C is set of all complex numbers. If $z_1\in P\cap H_1, z_2\in P$ $\cap H_2$ and O represent the origin, then $\angle Z_1OZ_2$ = Watch Free Video Solution on Doubtnut
25	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** Let ω be a complex cube root of unity with $\omega\neq 1 and P=\left[p_{ij}\right]$ be a $n\times n$ matrix withe $p_{ij}=\omega^{i+j}$. Then $p^2\neq O, whe\cap =$ a.57 b. 55 c. 58 d. 56 Watch Free Video Solution on Doubtnut
26	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** The function $f(x)=2\lvert x\rvert$ $+\lvert x+2\rvert=\lvert\lvert x\rvert 2\rvert$ $-2\lvert x\rvert\rvert$ has a local minimum or a local maximum at $x=-2$ (b) $-\frac{2}{3}$ (c) 2 (d) $\frac{2}{3}$

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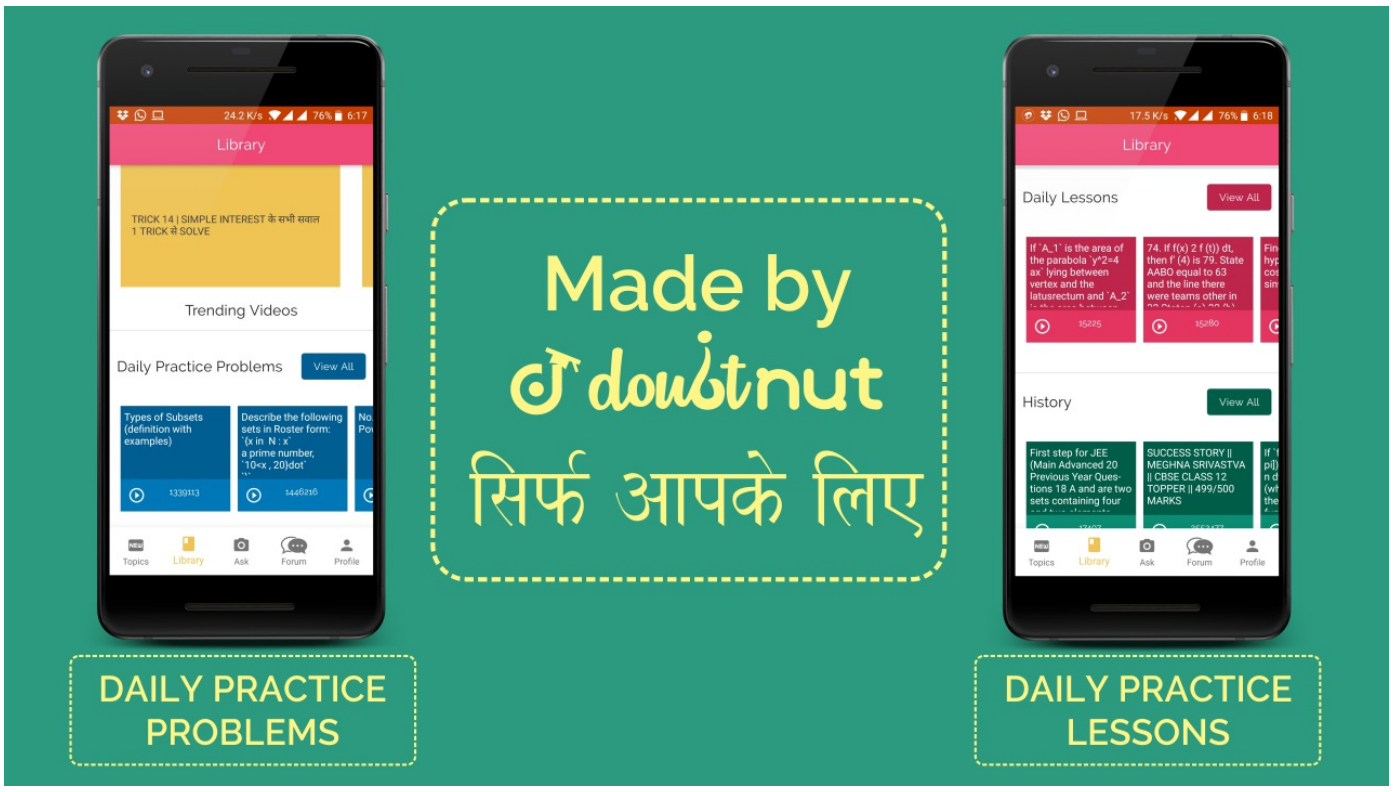
27	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** Let $f[0,1] \rightarrow R$ (the set of all real numbers be a function.Suppose the function f is twice differentiable, $f(0)=f(1)=0$,and satisfies $f'(x)-2f'(x)$ $+f(x) \leq e^x, x$ $\in [0,1]$ .Which of the following is true for $0<x<1$? Watch Free Video Solution on Doubtnut
	
28	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** Let PQ be a focal chord of the parabola $y^2=4ax$ The tangents to the parabola at P and Q meet at a point lying on the line $y=2x+a, a>0$. Length of chord PQ is Watch Free Video Solution on Doubtnut
29	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** A box B_1, contains 1 white ball, 3 red balls and 2 black balls. Another box B_2, contains 2 white balls, 3 red balls and 4 black balls. A third box B_3, contains 3 white balls, 4 red balls and 5 black balls. Watch Free Video Solution on Doubtnut
30	**JEE ADVANCED MATHS SOLUTIONS - 2013 || Paper 2** A box B_1, contains 1 white ball, 3 red balls and 2 black balls. Another box B_2, contains 2 white balls, 3 red balls and 4 black balls. A third box B_3, contains 3 white balls, 4 red balls and 5 black balls. Watch Free Video Solution on Doubtnut