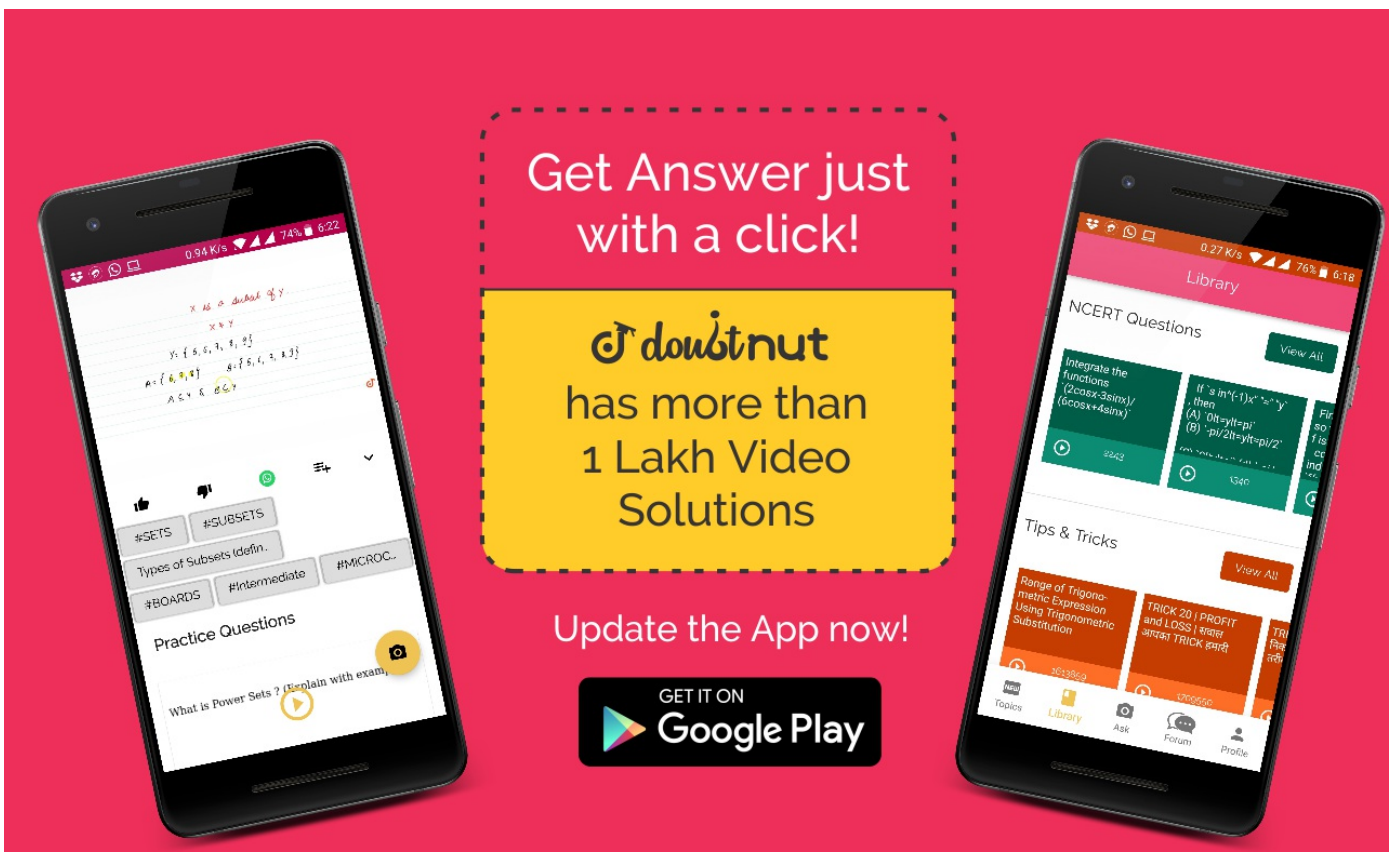
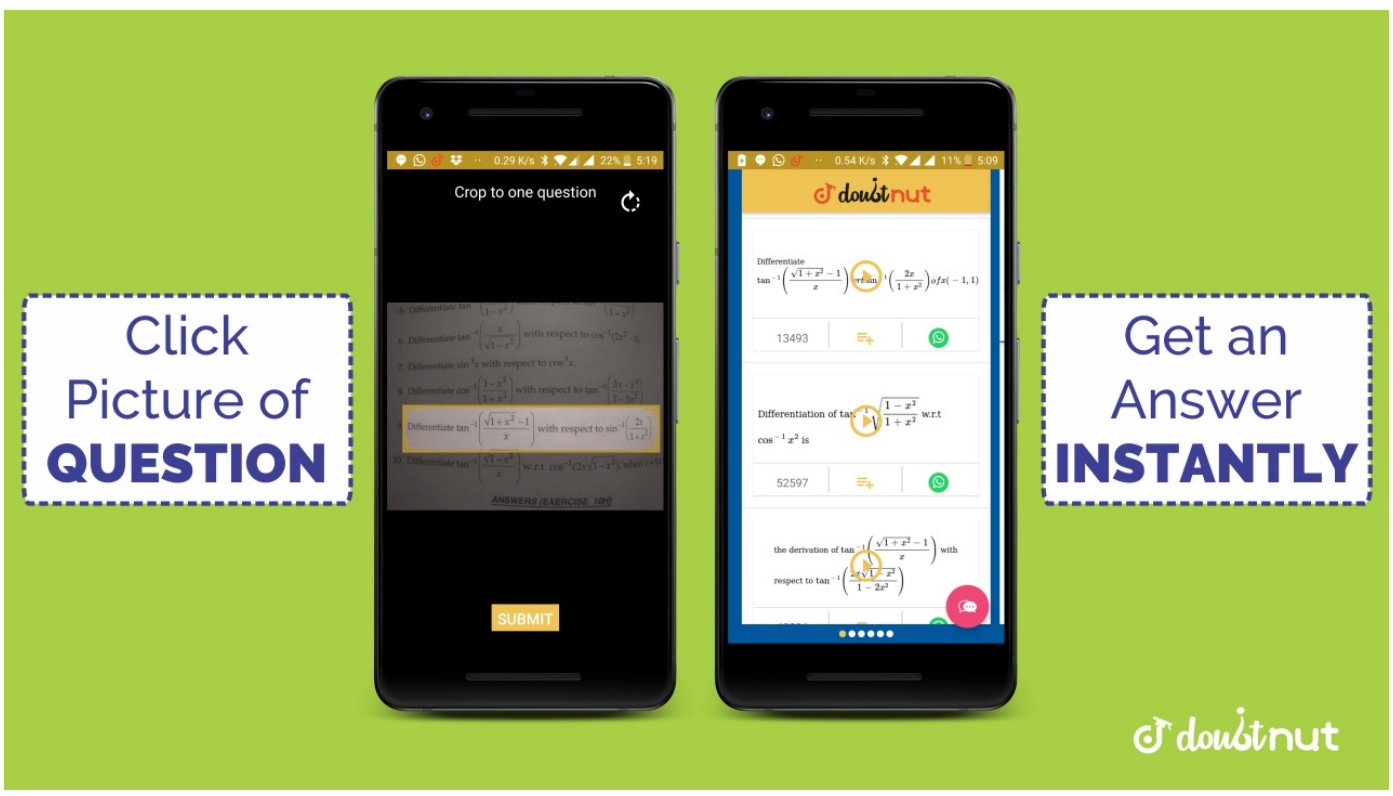
JEE ADVANCED MATHS SOLUTIONS

YEAR 2018

Ques No.	Question
1	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** For a non-zero complex number z , let $arg(z)$ denote the principal argument with $\pi < arg(z) \leq \pi$ Then, which of the following statement(s) is (are) FALSE? $arg(-1, -i)$ $= \frac{\pi}{4}$, where $i = \sqrt{-1}$ (b) The function $f: R \rightarrow (-\pi, \pi]$, defined by $f(t)$ $= arg(-1 + it)$ for all $t \in R$, is continuous at all points of $\mathbb{R}$, where $i = \sqrt{-1}$ (c) For any two non-zero complex numbers z_1 and z_2 , $arg\left(\frac{z_1}{z_2}\right) - arg(z_1)$ $+ arg(z_2)$ is an integer multiple of 2π (d) For any three given distinct complex numbers z_1 , z_2 and z_3 , the locus of the point z satisfying the condition $arg\left(\frac{(z - z_1)(z_2 - z_3)}{(z - z_3)(z_2 - z_1)}\right)$ $= \pi$, lies on a straight line Watch Free Video Solution on Doubtnut
2	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** In a triangle PQR , let $\angle PQR = 30o$ and the sides PQ and QR have lengths $10\sqrt{3}$ and 10, respectively. Then, which of the following statement(s) is (are) TRUE? $\angle QPR = 45o$ (b) The area of the triangle PQR is $25\sqrt{3}$ and $\angle QRP = 120o$ (c) The radius of the incircle of the triangle PQR is $10\sqrt{3} - 15$ (d) The area of the circumcircle of the triangle PQR is $100\ \pi$ Watch Free Video Solution on Doubtnut
3	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** Let $P_1: 2x + y - z = 3$ and $P_2: x + 2y + z = 2$ be two planes. Then, which of the following statement(s) is (are) TRUE? The line of intersection of P_1 and P_2 has direction ratios $1, 2, -1$ (b) The line $\frac{3x - 4}{9} = \frac{1 - 3y}{9}$ $= \frac{z}{3}$

	is perpendicular to the line of intersection of P_1 and P_2 (c) The acute angle between P_1 and P_2 is $60o$ (d) If P_3 is the plane passing through the point $(4,\ 2,\ -2)$ and perpendicular to the line of intersection of P_1 and P_2 , then the distance of the point $(2,\ 1,\ 1)$ from the plane P_3 is $\frac{2}{\sqrt{3}}$ Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
4	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** For every twice differentiable function $f:R\to[-2,\ 2]$ with $(f(0))^2+\left(f'(0)\right)^2$ $=85$, which of the following statement(s) is (are) TRUE? There exist $r,\ s\in R$ where `roo)f(x)=1$(d)There\exists$alpha in (-4,\ 4)$sucht$^f(alpha)+f"(alpha)=0 and f^(prime)(alpha)!=0` Watch Free Video Solution on Doubtnut
5	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** Let $f:R\to R$ and $g:R\to R$ be two non-constant differentiable functions. If $f'(x)$ $=\left(e^{(f(x)-g(x))}\right)g'(x)$ for all $x\in R$, and $f(1)=g(2)=1$, then which of the following statement(s) is (are) TRUE? $f(2)<1-(\log)_e2$ (b) $f(2)>1-(\log)_e2$ (c) $g(1)>1-(\log)_e2$ (d) $g(1)<1-(\log)_e2$ Watch Free Video Solution on Doubtnut
	JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1 Let $f:[0,\ \infty)\to R$ be a continuous function such that

6	$f(x) = 1 - 2x + \int_0^x e^{x-t} f(t) dt$ for all $x \in [0, \infty)$. Then, which of the following statement(s) is (are) TRUE? The curve $y = f(x)$ passes through the point $(1, 2)$ (b) The curve $y = f(x)$ passes through the point $(2, -1)$ (c) The area of the region $\left\{(x, y) \in [0, 1] \times R: f(x) \leq y \leq \sqrt{1 - x^2}\right\}$ is $\frac{\pi - 2}{4}$ (d) The area of the region $\left\{(x, y) \in [0, 1] \times R: f(x) \leq y \leq \sqrt{1 - x^2}\right\}$ is $\frac{\pi - 1}{4}$ Watch Free Video Solution on Doubtnut
7	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** The value of $\left(\left((\log)_2 9\right)^2\right)^{\frac{1}{(\log)_2\left((\log)_2 9\right)}} \times \left(\sqrt{7}\right)^{\frac{1}{(\log)_4 7}}$ is _____. Watch Free Video Solution on Doubtnut
	
8	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** The number of 5 digit numbers which are divisible by 4, with digits from the set $\{1, 2, 3, 4, 5\}$ and the repetition of digits is allowed, is _____.

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9	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** Let X be the set consisting of the first 2018 terms of the arithmetic progression $1, 6, 11, ,$ and Y be the set consisting of the first 2018 terms of the arithmetic progression $9, 16, 23, ..$. Then, the number of elements in the set $X \cup Y$ is _____. Watch Free Video Solution on Doubtnut
10	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** The number of real solutions of the equation $\sin^{-1}\left(\sum_{i=1}^{\infty} x^{i+1} - x\right.$ $\left.\sum_{i=1}^{\infty}\left(\frac{x}{2}\right)^{i}\right) = \frac{\pi}{2}$ $-\cos^{-1}\left(\right.$ $\sum_{i=1}^{\infty}\left(-\frac{x}{2}\right)^{i} -$ $\left.\sum_{i=1}^{\infty}(-x)^{i}\right)$ lying in the interval $\left(-\frac{1}{2}, \frac{1}{2}\right)$ is ____. (Here, the inverse trigonometric function $= \sin^{-1} x$ and $\cos^{-1} x$ assume values in $\left[\frac{\pi}{2}, \frac{\pi}{2}\right]$ and $[0, \pi]$, respectively.) Watch Free Video Solution on Doubtnut
11	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** For each positive integer n, let $y_n = \frac{1}{n}\left((n+1)(n\right.$ $\left.+2)n \dot{+} n\right)^{\frac{1}{n}}$ For $x \in R$ let $[x]$ be the greatest integer less than or equal to x. If $(\lim)_{n \to \infty} y_n = L$, then the value of $[L]$ is _____. Watch Free Video Solution on Doubtnut

12	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** Let $\vec{a}$ and $\vec{b}$ be two unit vectors such that $\vec{a} . \vec{b} = 0$ For some $x, y \in R$, let $\vec{c} = x\vec{a} + y\vec{b}$ $+ \left(\vec{a} \times \vec{b}\right.$ If $\left(\left\|\vec{c}\right\| = 2\right.$ and the vector $\vec{c}$ is inclined at same angle α to both $\vec{a}$ and $\vec{b}$ then the value of $8\cos^2\alpha$ is Watch Free Video Solution on Doubtnut
13	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** Let $a,\ b,\ c$ be three non-zero real numbers such that the equation $\sqrt{3}\, a\cos x + 2$ $b\sin x = c,\ x$ $\in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$, has two distinct real roots α and β with $\alpha + \beta = \frac{\pi}{3}$. Then, the value of $\frac{b}{a}$ is _____. Watch Free Video Solution on Doubtnut
14	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** A farmer F_1 has a land in the shape of a triangle with vertices at $P(0,\ 0),\ Q(1,\ 1)$ and $R(2,\ 0)$. From this land, a neighbouring farmer F_2 takes away the region which lies between the side PQ and a curve of the form $y = x^n\ (n > 1)$. If the area of the region taken away by the farmer F_2 is exactly 30% of the area of PQR , then the value of n is _____. Watch Free Video Solution on Doubtnut
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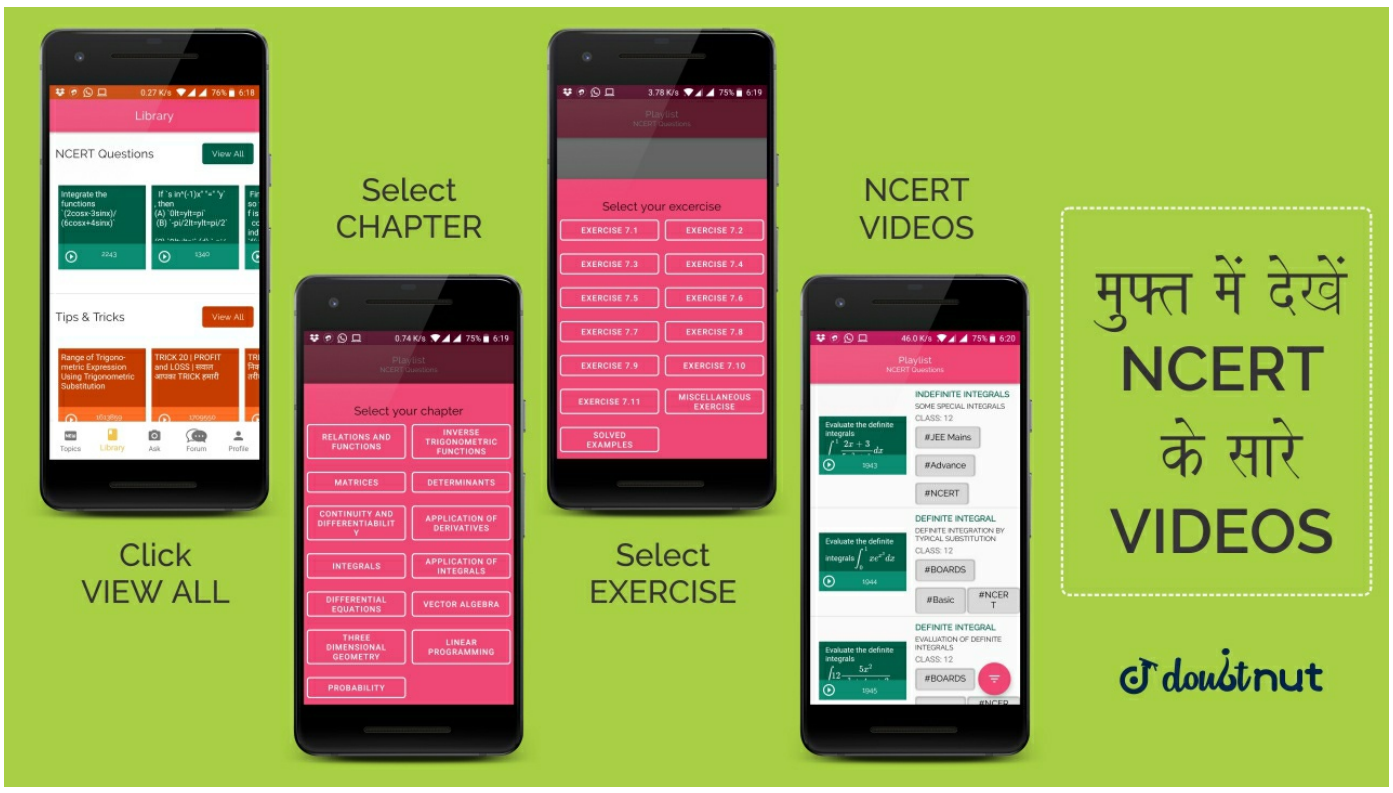
15	PARAGRAPH X Let S be the circle in the xy -plane defined by the equation $x^2 + y^2 = 4$. (For Ques. No 15 and 16) Let E_1E_2 and F_1F_2 be the chords of S passing through the point $P_0(1,\ 1)$ and parallel to the x-axis and the y-axis, respectively. Let G_1G_2 be the chord of S passing through P_0 and having slope -1 . Let the tangents to S at E_1 and E_2 meet at E_3 , the tangents to S at F_1 and F_2 meet at F_3 , and the tangents to S at G_1 and G_2 meet at G_3 . Then, the points $E_3,\ F_3$ and G_3 lie on the curve $x + y = 4$ (b) $(x-4)^2 + (y-4)^2 = 16$ (c) $(x-4)(y-4) = 4$ (d) $xy = 4$ Watch Free Video Solution on Doubtnut
	
16	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** Let S be the circle in the xy -plane defined by the equation $x^2 + y^2 = 4$. (For Ques. No 15 and 16) Let P be a point on the circle S with both coordinates being positive. Let the tangent to S at P intersect the coordinate axes at the points M and N . Then, the mid-point of the line segment MN must lie on the curve $(x+y)^2 = 3xy$ (b) $x^{2/3} + y^{2/3} = 2^{4/3}$ (c) $x^2 + y^2 = 2xy$ (d) $x^2 + y^2 = x^2y^2$ Watch Free Video Solution on Doubtnut
17	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 1** There are five students $S_1,\ S_2,\ S_3,\ S_4$ and S_5 in a music class and for them there are five seats $R_1,\ R_2,\ R_3,\ R_4$ and R_5 arranged in a row, where initially the seat R_i is allotted to the student $S_i,\ i = 1,\ 2,\ 3,\ 4,\ 5$. But, on the examination day, the five students are randomly allotted five seats. The probability that, on the examination day, the student S_1 gets the previously allotted seat R_1 , and NONE of the remaining students gets the seat previously allotted to him/her is $\frac{3}{40}$ (b) $\frac{1}{8}$ (c) $\frac{7}{40}$ (d) $\frac{1}{5}$ Watch Free Video Solution on Doubtnut
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PARAGRAPH A There are five students $S_1,\ S_2,\ S_3,\ S_4$ and S_5 in a music class and for them there are five seats $R_1,\ R_2,\ R_3,\ R_4$ and R_5 arranged in a row, where initially the seat R_i is allotted to the student $S_i,\ i=1,\ 2,\ 3,\ 4,$

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. But, on the examination day, the five students are randomly allotted five seats. For $i=1,\ 2,\ 3,\ 4,$ let T_i denote the event that the students S_i and S_{i+1} do NOT sit adjacent to each other on the day of the examination. Then, the probability of the event $T_1 \cap T_2 \cap T_3 \cap T_4$ is $\frac{1}{15}$ (b) $\frac{1}{10}$ (c) $\frac{7}{60}$ (d) $\frac{1}{5}$

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For any positive integer n , define $f_n:(0,\infty) \rightarrow R$ as $f_n(x)=$

$$\sum_{j=1}^{n} \tan^{-1}$$

$$\left(\frac{1}{1+(x+j)(x+j}\right.$$

$$\left.-1)\right)$$

for all $x \in (0,\infty)$. Here, the inverse trigonometric function $\tan^{-1} x$ assumes values in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$. Then, which of the following statement(s) is (are) TRUE?

$$\sum_{j=1}^{5} \tan^2\left(f_j(0)\right)$$

$$=55$$

(b)

$$\sum_{j=1}^{10}(1+fj$$

$$'(0))\sec^2\left(f_j(0)\right)$$

$$=10$$

(c) For any fixed positive integer n ,

$$\left(\lim\right)_{x \rightarrow \infty} \tan(f_n(x))$$

$$=\frac{1}{n}$$

(d) For any fixed positive integer n ,

$$\left(\lim\right)_{x \rightarrow \infty} \sec^2(f_n(x))$$

$$=1$$

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20	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2** Let T be the line passing through the points $P(-2,7)$ and $Q(2,-5)$. Let F_1 be the set of all pairs of circles (S_1, S_2) such that T is tangent to S_1 at P and tangent to S_2 at Q, and also such that S_1 and S_2 touch each other at a point, say, M. Let E_1 be the set representing the locus of M as the pair (S_1, S_2) varies in F_1. Let the set of all straight lines segments joining a pair of distinct points of E_1 and passing through the point $R(1,1)$ be F_2. Let E_2 be the set of the mid-points of the line segments in the set F_2. Then, which of the following statement(s) is (are) TRUE? The point $(-2,7)$ lies in E_1 (b) The point $\left(\frac{4}{5}, \frac{7}{5}\right)$ does NOT lie in E_2 (c) The point $\left(\frac{1}{2}, 1\right)$ lies in E_2 (d) The point $\left(0, \frac{3}{2}\right)$ does NOT lie in E_1 Watch Free Video Solution on Doubtnut
21	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2** Let S be the set of all column matrices $[b_1 b_2 b_3]$ such that $b_1, b_2, b_3 \in R$ and the system of equations (in real variable) $-x+2y+5z=b_1$ $2x-4y+3z=b_2$ $x-2y+2z=b_3$ has at least one solution. Then, which of the following system(s) (in real variables) has (have) at least one solution for each $[b_1 b_2 b_3] \in S$? (a) $x+2y+3z=b_1$, $4y+5z=b_2$ and $x+2y+6z=b_3$ (b) $x+y+3z=b_1$, $5x+2y+6z=b_2$ and $-2x-y-3z=b_3$ (c) $-x+2y-5z=b_1$, $2x-4y+10z=b_2$ and $x-2y+5z=b_3$ (d) $x+2y+5z=b_1$, $2x+3z=b_2$ and $x+4y-5z=b_3$ Watch Free Video Solution on Doubtnut

22	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2** Consider two straight lines, each of which is tangent to both the circle $x^2 + y^2 = \frac{1}{2}$ and the parabola $y^2 = 4x$. Let these lines intersect at the point Q . Consider the ellipse whose center is at the origin $O(0,\ 0)$ and whose semi-major axis is OQ . If the length of the minor axis of this ellipse is $\sqrt{2}$, then which of the following statement(s) is (are) TRUE? For the ellipse, the eccentricity is $\frac{1}{\sqrt{2}}$ and the length of the latus rectum is 1 (b) For the ellipse, the eccentricity is $\frac{1}{2}$ and the length of the latus rectum is $\frac{1}{2}$ (c) The area of the region bounded by the ellipse between the lines $x = \frac{1}{\sqrt{2}}$ and $x = 1$ is $\frac{1}{4\sqrt{2}}(\pi - 2)$ (d) The area of the region bounded by the ellipse between the lines $x = \frac{1}{\sqrt{2}}$ and $x = 1$ is $\frac{1}{16}(\pi - 2)$ Watch Free Video Solution on Doubtnut
23	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2** Let $s,\ t,\ r$ be non-zero complex numbers and L be the set of solutions $z = x + iy\ \left(x,\ y \in \mathbb{R},\ \ i = \sqrt{-1}\right)$ of the equation $sz + tz + r = 0$, where $z = x - iy$. Then, which of the following statement(s) is (are) TRUE? If L has exactly one element, then $\lvert s\rvert \neq \lvert t\rvert$ (b) If $\lvert s\rvert = \lvert t\rvert$, then L has infinitely many elements (c) The number of elements in $\ln n\{z: \lvert z - 1 + i\rvert = 5\}$ is at most 2 (d) If L has more than one element, then L has infinitely many elements Watch Free Video Solution on Doubtnut
	
	JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2 Let $f: (0,\ \pi) \to R$ be a twice differentiable function such that

24	$\left(\lim_{t \to x} \frac{f(x)\sin t - f(x)\sin x}{t - x}\right) = \sin^2 x$ for all $x \in (0,\ \pi)$. If $f\left(\frac{\pi}{6}\right) = -\frac{\pi}{12}$, then which of the following statement(s) is (are) TRUE? $f\left(\frac{\pi}{4}\right) = \frac{\pi}{4\sqrt{2}}$ (b) $f(x) < \frac{x^4}{6} - x^2$ for all $x \in (0,\ \pi)$ (c) There exists $\alpha \in (0,\ \pi)$ such that $f'(\alpha) = 0$ (d) $f\left(\frac{\pi}{2}\right) + f\left(\frac{\pi}{2}\right) = 0$ Watch Free Video Solution on Doubtnut
25	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2** The value of the integral $\int_0^{\frac{1}{2}} \frac{1+\sqrt{3}}{\left((x+1)^2(1-x)^6\right)^{\frac{1}{4}}} dx$ is _____. Watch Free Video Solution on Doubtnut
26	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2** Let P be a matrix of order 3×3 such that all the entries in P are from the set $\{-1,\ 0,\ 1\}$. Then, the maximum possible value of the determinant of P is _____. Watch Free Video Solution on Doubtnut
27	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2** Let X be a set with exactly 5 elements and Y be a set with exactly 7 elements. If α is the number of one-one function from X to Y and β is the number of onto function from Y to X , then the value of $\frac{1}{5!}(\beta - \alpha)$ is _____. Watch Free Video Solution on Doubtnut

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Let $f: R \to R$ be a differentiable function with $f(0) = 0$. If $y = f(x)$ satisfies the differential equation

$$\frac{dy}{dx} = \frac{1}{(2+5x)(5x-2)}$$

, then the value of $\left(\lim\right)_{x \to \infty} f(x)$ is _____

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Let $f: R \to R$ be a differentiable function with $f(0) = 1$ and satisfying the equation

$$f(x+y) = f(x)f'(y) + f'(x)f(y)$$

for all $x,\ y \in R$. Then, the value of $(\log)_e(f(4))$ is _____

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Let P be a point in the first octant, whose image Q in the plane $x + y = 3$ (that is, the line segment PQ is perpendicular to the plane $x + y = 3$ and the mid-point of PQ lies in the plane $x + y = 3$) lies on the z-axis. Let the distance of P from the x-axis be 5. If R is the image of P in the xy-plane, then the length of PR is _____.

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Consider the cube in the first octant with sides OP,OQ and OR of length 1, along the x-axis, y-axis and z-axis, respectively, where $O(0, 0, 0)$ is the origin. Let $S\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{2}\right)$ be the centre of the cube and T be the vertex of the cube opposite to

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the origin O such that S lies on the diagonal OT. If $\overrightarrow{p} = \overrightarrow{SP}, \overrightarrow{q} = \overrightarrow{SQ},$ $\overrightarrow{r} = \overrightarrow{SR}$ and $\overrightarrow{t} = \overrightarrow{ST}$ then the value of $\left|\left(\overrightarrow{p} \times \overrightarrow{q}\right) \times \left(\overrightarrow{r} \times \left(\overrightarrow{t}\right)\right| \, is$

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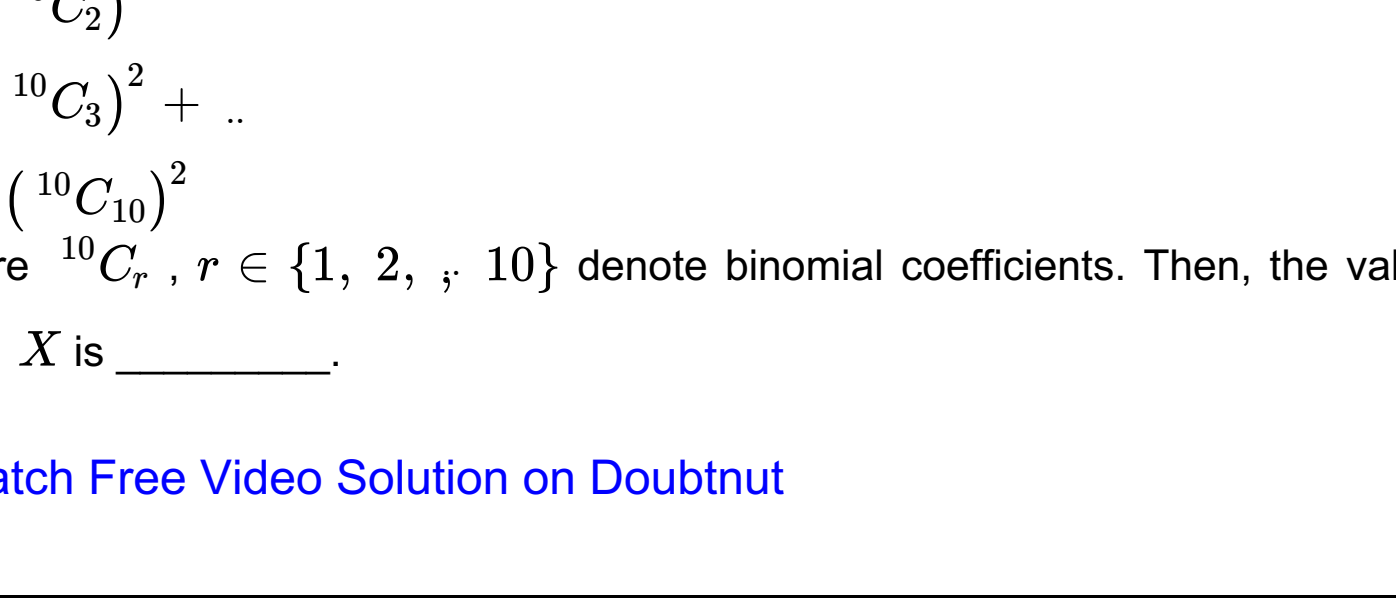

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Let $X = \left({}^{10}C_1\right)^2 + 2\left({}^{10}C_2\right)^2 + 3\left({}^{10}C_3\right)^2 + .. + 10\left({}^{10}C_{10}\right)^2$, where ${}^{10}C_r$, $r \in \{1, 2, ,. 10\}$ denote binomial coefficients. Then, the value of $\frac{1}{1430} X$ is _____.

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Let $E_1 = \left\{x \in R : x \neq 1 \text{ and } \frac{x}{x-1} > 0\right\}$ and

$E_2 = \left\{ x \in E_1 \right.$
$: \sin^{-1}$
$\left((\log)_e \left(\frac{x}{x-1} \right) \right)$
is a real number} . Here, the inverse trigonometric function $\sin^{-1} x$ assumes values in $\left[\frac{\pi}{2}, \frac{\pi}{2} \right]$ Let $f : E_1 \rightarrow R$ be the function defined by
$f(x)$
$= (\log)_e \left(\frac{x}{x-1} \right)$
and $g : E_2 \rightarrow R$ be the function defined by
$g(x)$
$= \sin^{-1}$
$\left((\log)_e \left(\frac{x}{x-1} \right) \right)$

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LIST-I LIST-II P. The range of f is 1.
$\left(-\infty, \frac{1}{1-e} \right]$
$\cup \left[\frac{e}{e-1}, \infty \right)$
Q. The range of g contains 2. $(0,1)$ R. The domain of f contains 3. $\left[\frac{1}{2}, \frac{1}{2} \right]$ S. The domain of g is 4. $(-\infty, 0) \cup (0, \infty)$ 5. $\left(-\infty, \frac{e}{e-1} \right]$ 6.
$(-\infty, 0)$
$\cup \left(\frac{1}{2}, \frac{e}{e-1} \right]$
The correct option is:
$P \rightarrow 4; \rightarrow 2; R$
$\rightarrow 1; S \rightarrow 1$
(b)
$P \rightarrow 3; Q \rightarrow 3; R$
$\rightarrow 6; S \rightarrow 5$
(c)
$P \rightarrow 4; Q \rightarrow 2; R$
$\rightarrow 1; S \rightarrow 6$
(d)
$P \rightarrow 4; Q \rightarrow 3; R$
$\rightarrow 6; S \rightarrow 5$

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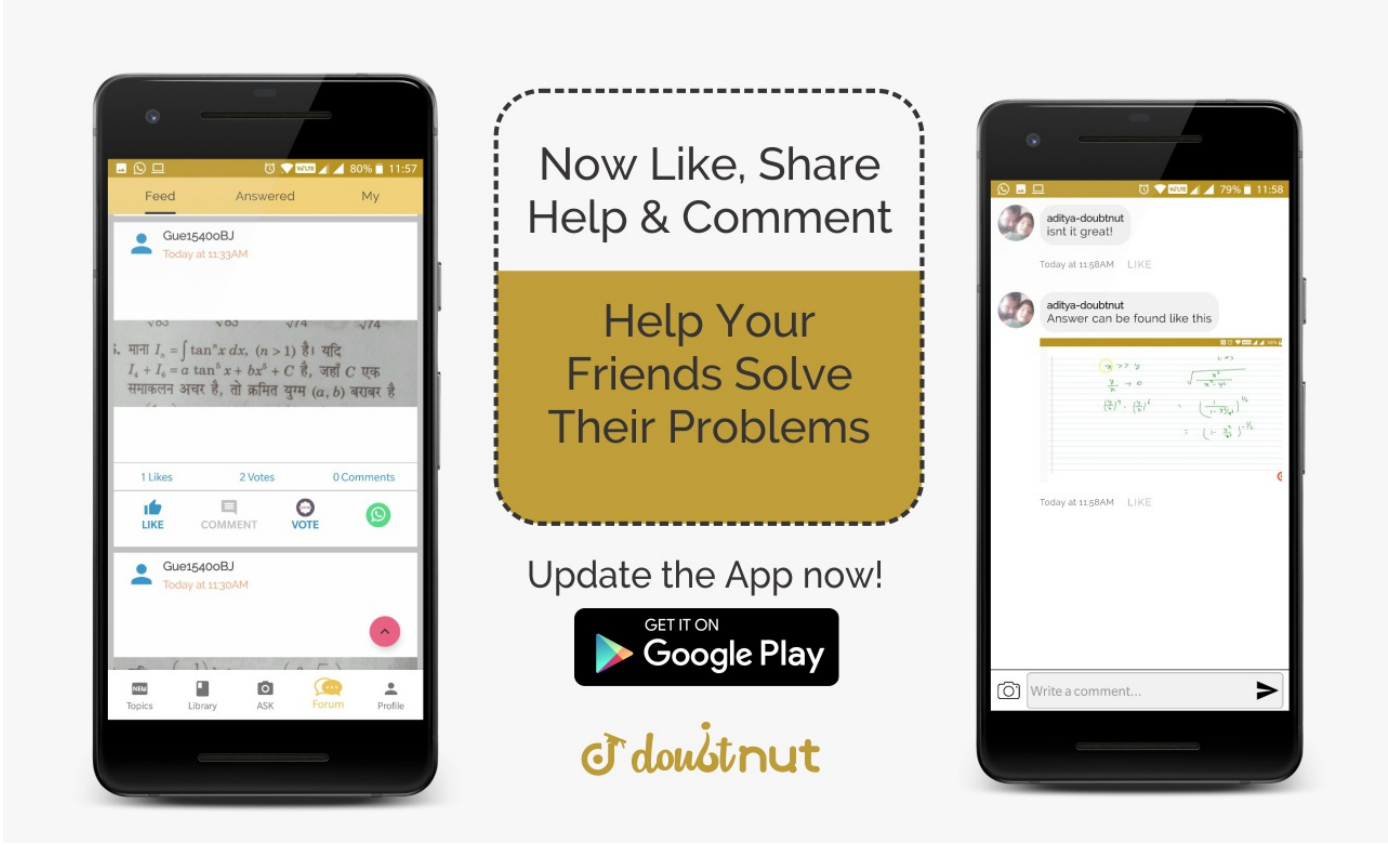
In a high school, a committee has to be formed from a group of 6 boys
$M_1, M_2, M_3, M_4,$
M_5, M_6
and 5 girls G_1, G_2, G_3, G_4, G_5 . Let α_1 be the total number of ways in which the committee can be formed such that the committee has 5 members, having exactly 3 boys and 2 girls. (ii) Let α_2 be the total number of ways in which the committee can be

34	formed such that the committee has at least 2 members, and having an equal number of boys and girls. (iii) Let α_3 be the total number of ways in which the committee can be formed such that the committee has 5 members, at least 2 of them being girls. (iv) Let α_4 be the total number of ways in which the committee can be formed such that the committee has 4 members, having at least 2 girls and such that both M_1 and G_1 are NOT in the committee together. LIST-I LIST-II P. The value of α_1 is 1. 136 Q. The value of α_2 is 2. 189 R. The value of α_3 is 3. 192 S. The value of α_4 is 4. 200 5. 381 6. 461 The correct option is: $P \rightarrow 4; Q \rightarrow 6; R$ $\rightarrow 2; S \rightarrow 1$ (b) $P \rightarrow 1; Q \rightarrow 4; R$ $\rightarrow 2; S \rightarrow 3$ (c) $P \rightarrow 4; Q \rightarrow 6; R$ $\rightarrow 5; S \rightarrow 2$ (d) $P \rightarrow 4; Q \rightarrow 2; R$ $\rightarrow 3; S \rightarrow 1$ Watch Free Video Solution on Doubtnut
35	**JEE ADVANCED MATHS SOLUTIONS - 2018 || Paper 2** Let $H: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, where $a > b > 0$, be a hyperbola in the xy -plane whose conjugate axis LM subtends an angle of $60o$ at one of its vertices N . Let the area of the triangle LMN be $4\sqrt{3}$. LIST-I LIST-II P. The length of the conjugate axis of H is 1. 8 Q. The eccentricity of H is 2. $\frac{\sqrt{4}}{3}$ R. The distance between the foci of H is 3. $\frac{2}{\sqrt{3}}$ S. The length of the latus rectum of H is 4. 4 The correct option is $P \rightarrow 4; \quad Q \rightarrow 2; \quad R$ $\rightarrow 1; \quad S \rightarrow 3$ (b) $P \rightarrow 4; \quad Q \rightarrow 3; \quad R$ $\rightarrow 1; \quad S \rightarrow 2$ (c) $P \rightarrow 4; \quad Q \rightarrow 1; \quad R$ $\rightarrow 3; \quad S \rightarrow 2$ (d) $P \rightarrow 3; \quad Q \rightarrow 4; \quad R$ $\rightarrow 2; \quad S \rightarrow 1$ Watch Free Video Solution on Doubtnut



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Let $f_1 : R \to R$, $f_2 : \left(-\frac{\pi}{2}, \frac{\pi}{2} \right) \to R$ $f_3 : \left(-1, e^{\frac{\pi}{2}} - 2 \right) \to R$ and $f_4 : R \to R$ be functions defined by $f_1(x) = \sin\left(\sqrt{1 - e^{-x \hat{} 2}} \right)$, (ii) $f_2(x) = \begin{cases} \frac{|\sin x|}{\tan^{-1} x} & \text{if } x \neq 01 \\ \text{if } x = 0, \end{cases}$

where the inverse trigonometric function $\tan^{-1} x$ assumes values in $\left(\frac{\pi}{2}, \frac{\pi}{2} \right)$, (iii) $f_3(x) = \left[\sin\left((\log)_e (x + 2) \right) \right]$, where, for $t \in R$, $[t]$ denotes the greatest integer less than or equal to t, (iv) $f_4(x) = \begin{cases} x^2 \sin\left(\frac{1}{x} \right) & \text{if } x \neq 00 \\ \text{if } x = 0 \end{cases}$. LIST-I LIST-II P. The function f_1 is 1. NOT continuous at $x = 0$ Q. The function f_2 is 2. continuous at $x = 0$ and NOT R. The function f_2 is differentiable at $x = 0$ S. The function f_2 is 3. differentiable at $x = 0$ and its is NOT continuous at $x = 0$ 4. differentiable at $x = 0$ and its derivative is continuous at $x = 0$ The correct option is

$P \rightarrow 2;\ \ Q \rightarrow 3;\ \ R \rightarrow 1;\ \ S \rightarrow 4$

(b)

$P \rightarrow 4;\ \ Q \rightarrow 1;\ \ R \rightarrow 2;\ \ S \rightarrow 3$

(c)

$P \rightarrow 4;\ \ Q \rightarrow 2;\ \ R \rightarrow 1;\ \ S \rightarrow 3$

(d)

$P \rightarrow 2;\ \ Q \rightarrow 1;\ \ R \rightarrow 4;\ \ S \rightarrow 3$