PAPER SOLUTION

From Meerut

JEE MAIN 2025

JAN	SHIFT
24	2nd

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JEE MAIN 2025 LIVE PAPER DISCUSSION

#Q. If $2cosx\ \frac{dy}{dx} = sin2x - 4y\ sinx, where\ x \in \left(0, \frac{\pi}{2}\right), y\left(\frac{\pi}{3}\right) = 0$ then find y' $\left(\frac{\pi}{4}\right) + y\left(\frac{\pi}{4}\right)$

A

B

C

D

Ans. (1)

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#Q. Triangle ABC with vertices have position vectors $2\vec{p}-3\vec{q}+2\vec{r}, \vec{p}-\vec{q}+3\vec{r}$ and $-\vec{p}+2\vec{q}+5\vec{r}$ and position vector of orthocentre is $\frac{\vec{p}+\vec{q}+\vec{r}}{4}$, then find position vector of circumcentre. (where $\vec{p}, \vec{q}$ and $\vec{r}$ are non-zero, non-coplanar vectors)

A

B

C

D

Ans. $\frac{7\vec{p}-9\vec{q}+39\vec{r}}{8}$

#Q. Let $\vec{a} = 3\,\hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = \vec{a} \times (\hat{i} - 2\hat{j})$ and $\vec{c} = \vec{b} \times \hat{k}$, then projection of $\vec{c} - 2\hat{j}$ on $\vec{a}$ is equal to

A $2\sqrt{14}$

B $3\sqrt{17}$

C $2\sqrt{7}$

D $\frac{3\sqrt{14}}{14}$

Ans. (D)

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#Q. If $\alpha > \beta > \gamma > 0$, then find $cot^{-1}\left(\frac{1+\alpha\beta}{\alpha-\beta}\right) + cot^{-1}\left(\frac{1+\beta\gamma}{\beta-\gamma}\right) + cot^{-1}\left(\frac{1+\gamma\alpha}{\gamma-\alpha}\right)$

A π

B Zero

C $\frac{\pi}{2} - (\alpha + \beta + \gamma)$

D 3π

Ans. (A)

#Q. The point P $\left(\frac{11}{2}, \alpha\right)$ lies on or inside the triangle formed by the lines $x + y = 11, x + 2y = 16$ and $2x + 3y = 29$, then minimum value of 10α is equal to

A

B

C

D

Ans. (55)

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#Q. Let $f(x) = [x] + |x - 2|$ where [k] denotes greatest integer $\leq$ k. if p is the number of points of discontinuity and q is the number of points of non differentiability in $x \in (-2, 3)$, then $p + q$ is

A 2

B 4

C 6

D 8

Ans. (D)

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#Q. $\int \frac{2x^2+5x+1}{\sqrt{x^2+x+1}}dx = x\sqrt{x^2+x+1} + \alpha\sqrt{x^2+x+1} + \beta ln\left(x+\frac{1}{2}+\sqrt{x^2+x+1}\right)+C$,
then $\alpha + 2\beta$ equal to

A

B

C

D

Ans. (0)

#Q. There is a group A of 5 boys and 3 girls and another group B of 5 boys and 6 girls. How many ways can we invite 4 boys and 4 girls for party with 5 from group a and 3 from group B.

(5) (A) 5B, 3G.

(3) (B) 5B, 6G

A. 4B, 1G — 3G → $5\times3\times20=300$

B. 3B, 2G — 1B, 2G → $10\times3\times5\times15=2250$.

C. 2B, 2G — 2B, 1G → $10\times1\times10\times6=600$

D. 3150

Ans. (3150)

#Q. $f(x) = \begin{vmatrix} a+\frac{\sin x}{x} & 1 & b \\ a & 1+\frac{\sin x}{x} & b \\ a & 1 & b+\frac{\sin x}{x} \end{vmatrix}$, if

$\lim_{x\to 0} f(x) = \lambda + \alpha a + \beta b$ then $(\lambda+\alpha+\beta)^2 =$ 16

$$\lim_{x\to 0} f(x) = \begin{vmatrix} a+1 & 1 & b \\ a & 2 & b \\ a & 1 & b+1 \end{vmatrix}$$

$$= \begin{vmatrix} 1 & -1 & 0 \\ 0 & 1 & -1 \\ a & 1 & b+1 \end{vmatrix}$$

$= 1(b+1+1)+1(0+a)$

$= b+2+a$

$= 2+a+b$

$\lambda = 2, \alpha = 1, \beta = 1$

A. 17

B. 16

C. 18

D. 19

Ans. (B)

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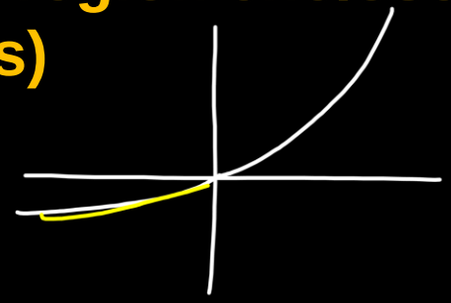
#Q. The area of region enclosed by the curves $y = e^x, y = |e^x - 1|$ and y –axis is (in sq. units)

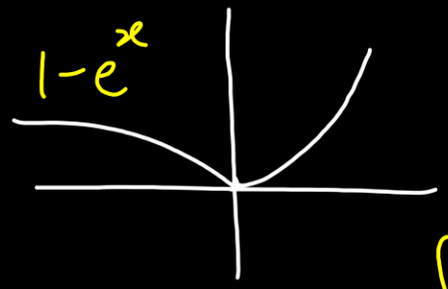


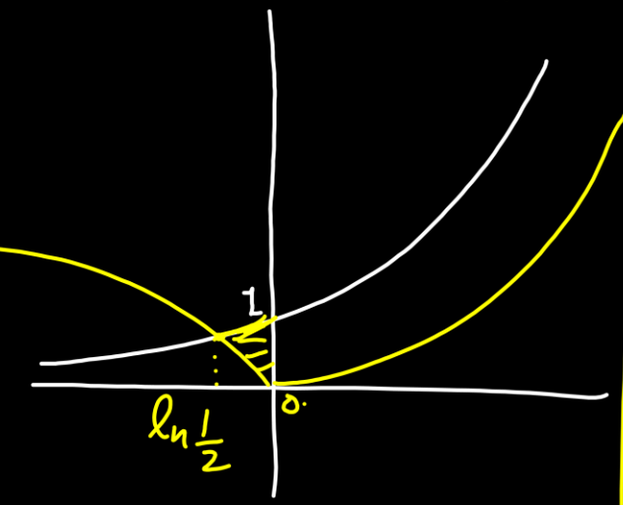
$e^x = 1 - e^x$

$e^x = \frac{1}{2}$

$x = \ln\frac{1}{2}$

$= 0$





$2 - (1 + \ln 2)$

$1 - \ln 2$

A. 1

B. 1-ln2

C. 1+ln2

D. ln2

$$\int_{\ln\frac{1}{2}}^{0} \left(e^x - (1 - e^x)\right) dx = \int_{\ln\frac{1}{2}}^{0} (2e^x - 1)\, dx$$

$$= (2e^x - x)\Big|_{\ln\frac{1}{2}}^{0} = 2 - 0 - \left(2e^{\ln\frac{1}{2}} - \ln\frac{1}{2}\right)$$

Ans. (B)

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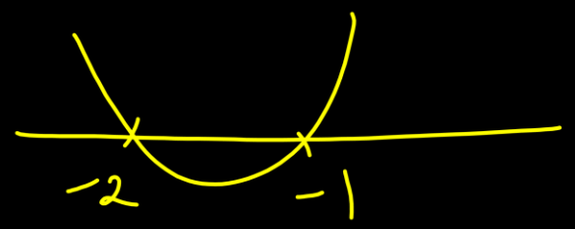
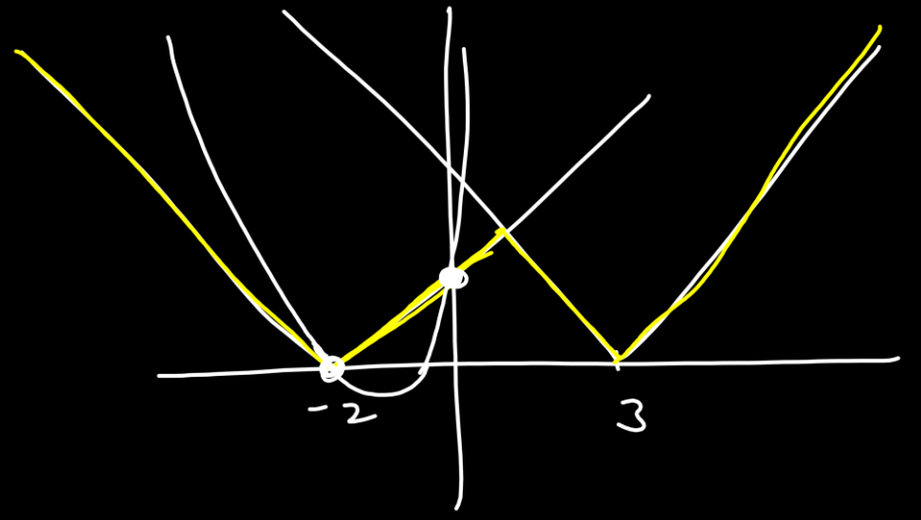
#Q. The number of real roots of the equation $x^2 + 3x + 2 = min(|x+2|, |x-3|)$ is

$(x+1)(x+2)$.





A 0

B 1

C 2

D 3

Ans. (C)

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$f(x_1) = f(x_2)$

#Q. A function $f: R \to (-1, 1)$ such that $f(x) = \frac{2^x - 2^{-x}}{2^x + 2^{-x}}$. The function f is

$$f(x) = \frac{4^x - 1}{4^x + 1} = \frac{4^x + 1 - 2}{4^x + 1} = 1 - \frac{2}{4^x + 1}$$

Inc

one-one

A. Both one-one and onto

B. Only one-one

C. Only onto

D. Both many-one and onto

$0 < 4^x < \infty$

$1 < 4^x + 1 < \infty$

$1 > \frac{1}{4^x + 1} > 0$

$2 > \frac{2}{4^x + 1} > 0$

$-1 < 1 - \frac{2}{4^x + 1} < 1$

$-1 < f(x) < 1$

Ans. (A)

#Q. If system of equation

$x + 2y - 3z = 2$

$2x + \lambda y + 5z = 5$

$4x + 3y + \mu z = 33$ has infinite solution, then $5\lambda + \mu$ is equal to

(A) 282

(B) 283

(C) 284

(D) 285

$(\lambda-4)y + 11z = 1$

$(3-2\lambda)y + (\mu-10)z = 23$

$$\frac{\lambda-4}{3-2\lambda} = \frac{11}{\mu-10} = \frac{1}{23}$$

$253 = \mu - 10 \Rightarrow \boxed{\mu = 263}$

$23\lambda - 92 = 3 - 2\lambda$

$25\lambda = 95 \Rightarrow \boxed{5\lambda = 19}$

Ans. (A)

#Q. Let S_n denotes the sum of the first n terms of an arithmetic progression. If $S_{40} = 1030$ and $S_{12} = 57$, then the value of $S_{30} - S_{10}$ is

A 505

B 510

C 515 ✓

D 520

$$S_{30} - S_{10}$$

$$= 15[2a + 29d] - 5[2a + 9d]$$

$$= 5[6a + 87d - 2a - 9d]$$

$$= 5[4a + 78d]$$

$$= 10[2a + 39d] = \frac{S_{40}}{2}$$

$$S_{40} = 20[2a + 39d]$$

Ans. (C)

#Q. Consider an event E such that a matrix of order 2×2 is invertible with entries 0 or 1. Then, P(E) is (P(X) denotes the probability of event X)

(A) $\frac{5}{8}$

(B) $\frac{3}{8}$

(C) $\frac{1}{8}$

(D) $\frac{7}{8}$

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} \neq 0$$

$$ad - bc \neq 0$$

$ad = 0$ & $bc = 1$ → (3)

(3) (1)

$ad = 1$ & $bc = 0$ → (3)

Fav. ways = 6.

Total ways = 16.

$$P = \frac{6}{16} = \frac{3}{8}.$$

Ans. (B)

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$n(n-1)! = n!$

#Q. If A and B are binomial coefficients of 30th and 12th term of binomial expansion $(1+x)^{2n-1}$. If 2A = 5B, then the value of n is

A. 20

B. 21 ✓

C. 14

D. 20

$2 \cdot {}^{2n-1}C_{29} = 5 \cdot {}^{2n-1}C_{11}$

$2 \cdot \frac{(2n-1)!}{(29)!(2n-30)!} = 5 \cdot \frac{(2n-1)!}{11!(2n-12)!}$

$\frac{(2n-12)!}{(2n-30)!} = \frac{6\times5\times(29)!}{6\times2\times(11)!} = \frac{(30)!}{(12)!}$

$2n-12 = 30$

$2n = 42$

$n = 21$

Ans. (B)

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#Q. If $7 = 5 + \frac{1}{7}(5+\alpha) + \frac{1}{7^2}(5+2\alpha) + \ldots\infty$ terms, then α is equal to

A. 6

B. 7

C. 5

D. 1

$$1 = \frac{\frac{1}{7}(5) + \frac{1}{7^2}(5+\alpha) + \ldots}{6 = 5 + \frac{1}{7}\alpha + \frac{1}{7^2}\alpha + \ldots}$$

$$1 = \frac{\alpha/7}{1-\frac{1}{7}}$$

$$1 = \frac{\alpha}{6} \Rightarrow \alpha = 6$$

Ans. (A)

#Q. The equation of chord of the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ with (3, 1) as mid-point is

$T = S_1$

$$\frac{xx_1}{25}+\frac{yy_1}{16}-1=\frac{x_1^2}{25}+\frac{y_1^2}{16}-1$$

$$\frac{3x}{25}+\frac{1}{16}y=\frac{9}{25}+\frac{1}{16}$$

$$\frac{48x+25y}{400}=\frac{144+25}{400}$$

$$48x+25y=169$$

A. $48x + 25y - 169 = 0$

B. $25x + 5y - 125 = 0$

C. $65x + 2y - 12 = 0$

D. $45x + 4y - 135 = 0$

Ans. (A)