PAPER SOLUTION

From Meerut

JEE MAIN 2025

JAN	SHIFT
23	1st

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#Q. $\int_{e^2}^{e^4} \frac{e^{\left(ln^2 x+1\right)^{-1}}}{e^{\left(ln^2 x+1\right)^{-1}}+e^{\left((6-ln\, x)^2+1\right)^{-1}}} \frac{dx}{x} =$ ________

(A)

(B)

(C)

(D)

Ans.(1)

#Q. Find the angle subtended by the chord of parabola $2y = 3x^2$ intercepted by the line $x + y = 1$ at vertex.

A

B

C

D

Ans.($\tan^{-1} 2\sqrt{7}$)

#Q. Centre of a circle lies on the positive x-axis such that centre coincides with focus of hyperbola $\frac{x^2}{\alpha^2}-\frac{y^2}{\beta^2}=1$ and diameter is equal to transverse axis, if equation of one of the tangent to circle is $x-y+1=0$ and circle subtends a chord of length $\frac{4}{\sqrt{13}}$ on $3x-2y+1=0$ then find $3\alpha^2+\beta^2$.

A

B

C

D

Ans.(25)

#Q. Find the value of $sin70^0\left(cot\,10^0\cdot cot70^0-1\right)$

A

B

C

D

Ans.(1)

#Q. The sum of all rational terms in the expansion of $\left(1+2^{\frac{1}{3}}+3^{\frac{1}{2}}\right)^{6}$ is

(A) 612

(B) 728

(C) 528

(D) 729

Ans.(A)

#Q. $\int_{e^2}^{e^4} \frac{e^{\left(ln^2 x+1\right)^{-1}}}{e^{\left(ln^2 x+1\right)^{-1}}+e^{\left((6-ln\,x)^2+1\right)^{-1}}} \frac{dx}{x} =$ ________

(A)

(B)

(C)

(D)

Ans.(1)

#Q. Let $I = \int \frac{dx}{(x-1)^{\frac{11}{13}}(x+15)^{\frac{15}{13}}}$ then I is

(A) ✓ $\frac{13}{32}\left(\frac{x-1}{x+15}\right)^{\frac{2}{13}} + C$

(B) $\frac{32}{13}\left(\frac{x-1}{x+15}\right)^{\frac{2}{13}} + C$

(C) $\frac{1}{32}\left(\frac{x+15}{x-1}\right)^{\frac{2}{13}} + C$

(D) $\frac{13}{32}\left(\frac{x+15}{x-1}\right)^{\frac{15}{13}} + C$

$$\int \frac{1}{\left(\frac{x-1}{x+15}\right)^{\frac{11}{13}}(x+15)^2}\,dx$$

$$\frac{x-1}{x+15} = t$$

$$\frac{16}{(x+15)^2}\,dx = dt$$

$$\frac{1}{16}\int t^{-\frac{11}{13}}\,dt$$

$$\frac{1}{16}\cdot\frac{t^{+\frac{2}{13}}}{\frac{2}{13}}$$

$$= \frac{13}{32}\left(\frac{x-1}{x+15}\right)^{\frac{2}{13}} + C.$$

Ans. (A)

#Q. The range of values of a for which $5x^3 - 15x - a = 0$ has 3 distinct solutions is (α, β) then $\beta - 2\alpha$ is

A

B

C

D

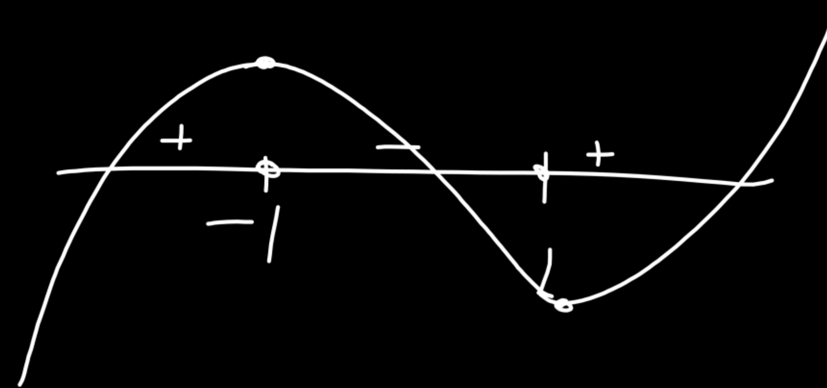
$$f'(x) = 15x^2 - 15$$
$$= 15(x-1)(x+1)$$

$$f(-1)f(1) < 0$$

$$(10-a)(-10-a) < 0$$

$$(a-10)(a+10) < 0$$

$$-10 < a < 10$$



Ans.(30)

$AB = BA$

#Q. Let A and B are non-singular commutative matrices. Then $A\left[\left(adjA^{-1}\right)\left(adj\left(B^{-1}\right)\right)\right]^{-1}B$ is equal to

$A\left[adj\left(B^{-1}A^{-1}\right)\right]^{-1}B$

$A\left[adj\left(AB\right)\right]B$

$A\left(adj\,A\right)\left(adj\,B\right)B$

$|A|I|B|I = |A||B|I$

(A) $|A||B|I_n$ ✓

(B) $\dfrac{I_n}{|A||B|}$

(C) $\dfrac{I_n}{|A|}\;\dfrac{I_n}{|A|}$

(D) $\dfrac{I_n}{|B|}$

Ans. (A)

#Q. Consider the set $S = \{1, 2, 3, .., 1000\}$. Then the number of arithmetic progression that can be formed using elements of set S such that first term is 1 and last term is 1000 is ?

(A) 8

(B) 12

(C) 15

(D) 4

$a_1 = 1$, $a_n = 1000$

$a_n - a_1 = 999$

$(n-1)d = 999$

$d = \frac{999}{n-1}$

$999 = 3^3 \times 37^1$

No. of divisors $= 4 \times 2 = 8$

Ans. (A)

#Q. If the curve satisfying the differential equation $\frac{dy}{dx} = \frac{6-2e^{2x}y}{1+e^{2x}}$ passes through (0, 0) and $(ln\ 2, k)$, then k is

(A) $\frac{3}{5} ln3$

(B) $\frac{6}{5} ln2$

(C) $\frac{8}{9} ln3$

(D) $\frac{7}{2} ln2$

$$\frac{dy}{dx} = \frac{6}{1+e^{2x}} - \frac{2e^{2x}y}{1+e^{2x}}$$

$$\frac{dy}{dx} + \frac{2e^{2x}}{1+e^{2x}}y = \frac{6}{1+e^{2x}}$$

$$I.F = e^{\int \frac{2e^{2x}}{1+e^{2x}}dx} = e^{\ln(1+e^{2x})} = 1+e^{2x}$$

$$y(1+e^{2x}) = 6x + 0$$

$$k(1+e^{2\ln 2}) = 6\ln 2$$

$$k(1+4) = 6\ln 2$$

$$k = \frac{6}{5}\ln 2$$

Ans. (B)

#Q. The area of larger portion enclosed by curves $y = |x-1|$ and $x^2 + y^2 = 25$ is equal to $\frac{1}{4}(\alpha\pi + \beta)$ (where α, β are natural numbers), then $\alpha + \beta$ equals to

(A)

(B)

(C)

(D)

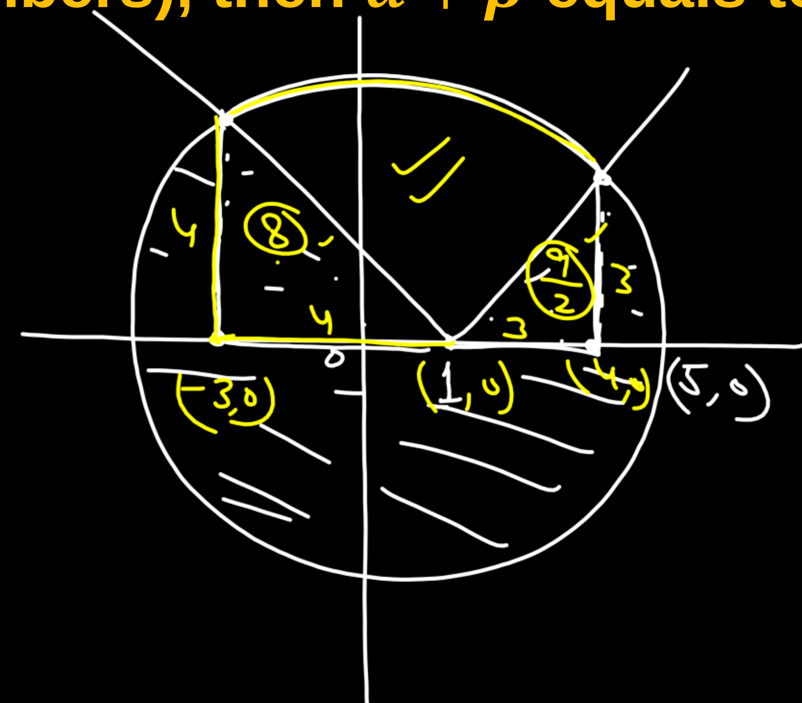
$$x^2 + (x-1)^2 = 25$$

$$x = -3, 4$$

$$\int_{-3}^{4} \sqrt{25 - x^2}\, dx$$

$$= \left[\frac{x}{2}\sqrt{25-x^2} + \frac{25}{2}\sin^{-1}\frac{x}{5}\right]_{-3}^{4}$$

$$= 2\times 3 + \frac{25}{2}\sin^{-1}\frac{4}{5} - \left[\frac{-3}{2}\times 4 - \frac{25}{2}\sin^{-1}\frac{3}{5}\right] = 12 + \frac{25}{2}\left[\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{3}{5}\right]$$



$$12 + \frac{25}{2} \cdot \frac{\pi}{2} = 12 + \frac{25\pi}{4}$$

$$\text{Smaller} = 12 + \frac{25\pi}{4} - 8 - \frac{9}{2} = \frac{25\pi}{4} - \frac{1}{2}$$

$$\text{Larger Area} = 25\pi - \left(\frac{25\pi}{4} - \frac{1}{2}\right) = \frac{75\pi}{4} + \frac{1}{2}$$

$$= \frac{1}{4}(75\pi + 2)$$

$$\alpha = 75, \ \beta = 2$$

$$\alpha + \beta = 77$$

Ans.(77)

$x^2 - 1$

$2x^2 - 2x + 1$

$D = 4 - 4 \times 2 \times 1 = -4 < 0$

#Q. Let $f(x) = \log_e x$ and $g(x) = \left(\frac{2x^4 - 2x^3 - x^2 + 2x - 1}{2x^2 - 2x + 1}\right)$, then domain of $f(g(x))$ for $x > 0$ is

A $(1, \infty)$ ✓

B $(0, \infty)$

C $\left(\frac{1}{2}, \infty\right)$

D $(0, 1)$

$f(g(x)) = \ln(g(x))$

$g(x) > 0$

$x^2 - 1 > 0$

$x > 1$

Ans. (A)

#Q. A relation defined on set A = $\{1, 2, 3, 4\}$, then how many ordered pairs are added to $R = \{(1,2), (2,3), (3,3)\}$ so that it becomes equivalence relation?

(A) 10

(B) 9

(C) 7

(D) 8

Ans. (D)

#Q. If $\left|\frac{z}{z+i}\right| = 2$ represents a circle with centre P then distance of P from D is (where D:(1, 5))

(A) $\sqrt{\frac{360}{9}}$

(B) $\sqrt{\frac{370}{9}}$

(C) $\frac{\sqrt{370}}{9}$

(D) $\frac{\sqrt{360}}{9}$

Ans.(B)

#Q. If the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ has equal roots and if $a + c = 5$ and $b = \frac{16}{5}$, then the value of $a^2 + c^2$ is equal to ?

A

B

C

D

Ans. (09)

JEE MAIN 2025 LIVE PAPER DISCUSSION

#Q. Two biased dice are tossed. Die 1 has 1 on two faces, 2 on two faces, 3 and 4 on other faces, while die 2 has 2 on 2 faces, 4 on 2 faces and 1 and 3 on other faces. Then the probability that when throwing these dice we get sum 4 or 5

(A) $\frac{3}{7}$

(B) $\frac{2}{3}$

(C) $\frac{4}{9}$ ✓

(D) $\frac{8}{9}$

Die 1	
1	→ 2
2	→ 2
3	→ 1
4	→ 1

Die 2	
2	→ 2
4	→ 2
1	→ 1
3	→ 1

Sum 4 → (1,3), (3,1), (2,2)

$2\times1 + 1\times1 + 2\times2 = 7$

Sum 5 → (1,4), (4,1), (2,3), (3,2)

$2\times2 + 1\times1 + 2\times1 + 1\times2 = 9$

fav. ways = 7 + 9 = 16

Total ways = 6 × 6 = 36

#Q. If $f(x)$ is continuous at x = 0, where

$$f(x) = \begin{cases} \frac{2}{x}\left(\sin(k_1+1)x + \sin(k_2+1)x\right) & x < 0 \\ 4 & x = 0 \\ \frac{2}{x}\log\left[\frac{k_2x+1}{k_1x+1}\right] & x > 0 \end{cases}$$

Then $k_1^2 + k_2^2$ is

(A) 2

(B)

(C)

(D)

L.H.L $= 2(k_1+1+k_2+1) = 4$

$k_1 + k_2 = 0$

RHL $= 2\lim_{x\to 0}\left[\frac{\log(1+k_2x)}{x} - \frac{\log(1+k_1x)}{x}\right] = 2(k_2-k_1)$

$2(k_2-k_1) = 4$

$k_2 - k_1 = 2$

$k_2 = 1,\ k_1 = -1$

Ans.(2)

#Q. Value of $cos^{-1}\left[\frac{12}{13}cos\,x + \frac{5}{13}sin\,x\right]$ is $\left(x \in \left[\frac{\pi}{2}, \pi\right]\right)$

A $x + tan^{-1}\frac{12}{13}$

B $x - tan^{-1}\frac{12}{13}$

C $x - tan^{-1}\frac{5}{12}$

D $x + tan^{-1}\left(\frac{4}{5}\right)$

$\frac{12}{13} = \cos\alpha, \quad \frac{5}{13} = \sin\alpha$

$\tan\alpha = \frac{5}{12}$

$0 < \alpha < \pi/4$

$\cos^{-1}[\cos\alpha\cos x + \sin\alpha\sin x]$

$\cos^{-1}[\cos(x-\alpha)]$

$= x - \alpha$

$= x - \tan^{-1}\left(\frac{5}{12}\right)$

#Q. If for the system of linear equations having infinite solutions

$(\lambda-4)x+(\lambda-2)y+\lambda z=0$

$2x+3y+5z=0$

$x+2y+6z=0$

then $\lambda^2+\lambda$ is

$81+9$

$=90$

$$\begin{vmatrix} \lambda-4 & \lambda-2 & \lambda \\ 2 & 3 & 5 \\ 1 & 2 & 6 \end{vmatrix}=0$$

$$(\lambda-4)(8)-(\lambda-2)(7)+\lambda(1)=0$$

$$8\lambda-32-7\lambda+14+\lambda=0$$

$$2\lambda-18=0 \Rightarrow \lambda=9$$

A

B

C

D

Ans. (90)

#Q. If for an arithmetic progression, if first term is 3 and sum of first four terms is equal to $\frac{1}{5}$ of the sum of next four terms, then the sum of first 20 terms is

(A) 1080

(B) 364

(C) -1080

(D) -364

Ans. (C)

#Q. How many word can be formed from the word DAUGHTER such that all vowels are not together

A. 34000

B. 35000

C. 36000

D. 37000

Ans.(C)