

Questions with Answer Keys

MathonGo

Q1 (22 July 2021 Shift 1)

The area (in sq. units) of the region bounded by the curves $x^2 + 2y - 1 = 0$, $y^2 + 4x - 4 = 0$ and $y^2 - 4x - 4 = 0$, in the upper half plane is ____.

Q2 (25 July 2021 Shift 1)

The area (in sq. units) of the region, given by the set $\{(x, y) \in \mathbf{R} \times \mathbf{R} \mid x \geq 0, 2x^2 \leq y \leq 4 - 2x\}$ is :

- (1) $\frac{8}{3}$
- (2) $\frac{17}{3}$
- (3) $\frac{13}{3}$
- (4) $\frac{7}{3}$

Q3 (27 July 2021 Shift 1)

If the area of the bounded region

$R = \{(x, y) : \max \{0, \log_e x\} \leq y \leq 2^x, \frac{1}{2} \leq x \leq 2\}$ is, $\alpha(\log_e 2)^{-1} + \beta(\log_e 2) + \gamma$, then the value of $(\alpha + \beta - 2\gamma)^2$ is equal to :

- (1) 8
- (2) 2
- (3) 4
- (4) 1

Q4 (27 July 2021 Shift 2)

The area of the region bounded by $y - x = 2$ and $x^2 = y$ is equal to :-

- (1) $\frac{16}{3}$
- (2) $\frac{2}{3}$
- (3) $\frac{9}{2}$

Area

JEE Main 2021 (July) Chapter-wise Questions

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Answer Key

Q1 (2)

Q2 (4)

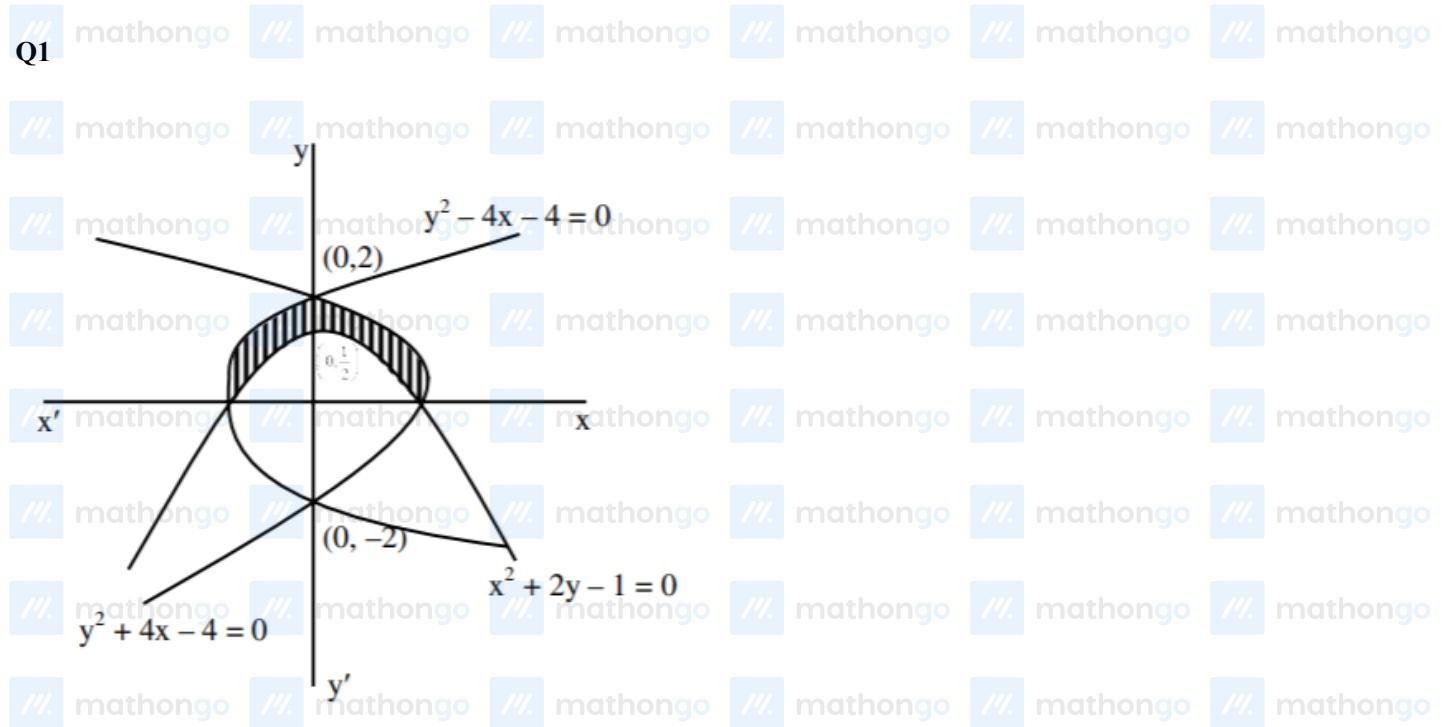
Q3 (2)

Q4 (3)

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Hints and Solutions

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$$\begin{aligned} &= 2 \left[\int_0^2 \left(\frac{4-y^2}{4} \right) dy - \int_0^1 \left(\frac{1-x^2}{2} \right) dx \right] \\ &= 2 \left[\frac{4}{3} - \frac{1}{3} \right] = (2) \end{aligned}$$



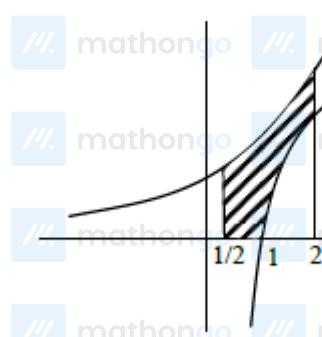
$$\begin{aligned} \text{Required area} &= \int_0^1 (4 - 2x - 2x^2) dx = 4x - x^2 - \frac{2x^3}{3} \Big|_0^1 \\ &= 4 - 1 - \frac{2}{3} = \frac{7}{3} \end{aligned}$$



Hints and Solutions

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$$R = \left\{ (x, y) \mid \max(0, \log_e x) \leq y \leq 2^x, \frac{1}{2} \leq x \leq 2 \right\}$$



$$\int_{\frac{1}{e}}^2 2^x dx - \int_1^2 \ln x dx$$

$$\Rightarrow \left[\frac{2^x}{\ln 2} \right]_{1/2}^2 - [x \ln x - x]_1^2$$

$$\Rightarrow \frac{(2^2) - 2^{1/2}}{\log_0 2} = (2 \ln 2 -$$

$$\Rightarrow \frac{(2^2 - \sqrt{2})}{\log_2 2} - 2 \ln 2 + 1$$

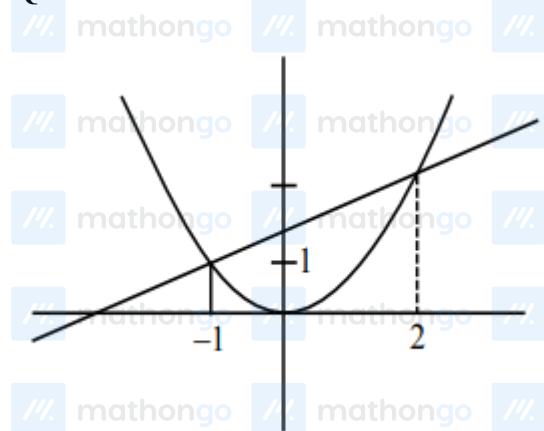
$$\therefore \alpha = 2^2 - \sqrt{2}, \beta = -2, \gamma = 1$$

$$\Rightarrow (\alpha + \beta + 2\gamma)^2$$

$$\Rightarrow \left(2^2 - \sqrt{2} - 2 - 2\right)^2$$

$$\Rightarrow (\sqrt{2})^2 = 2$$

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$$y - x = 2, x^2 = y$$

Now, $x^2 = 2 + x$

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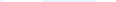
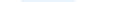
Area

JEE Main 2021 (July) Chapter-wise Questions

Hints and Solutions

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$\Rightarrow x^2 - x - 2 \equiv 0$

⇒ $(x + 1)(x - 2) = 0$      

$$\text{Area} = \int_{-1}^2 (2 + x - x^2)$$

$$= \left| 2x + \frac{x^2}{2} - \frac{x^3}{3} \right|^2$$

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$$= 6 - 3 + 2 - \frac{1}{2} = \frac{9}{2}$$

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