



JEE (Main) 2021

Questions & Solutions

(Reproduced from Memory Retention)

Date : 20 July, 2021 (SHIFT-1) Time ; (9.00 am to 12.00 pm)

Duration : 3 Hours | Max. Marks : 300

SUBJECT : MATHEMATICS

1. $\int_0^a e^{x-[x]} dx = 10e - 9$. Find a ?

Sol. As $\int_0^1 e^{\{x\}} dx = e - 1$

$$\Rightarrow \int_0^1 e^{\{x\}} dx = 10(e - 1) + 1$$

let $a = n + f$ $n \in \mathbb{I}$ $f \in [0, 1)$

$$\Rightarrow \int_0^{n+f} e^{\{x\}} dx = \int_0^n e^{\{x\}} dx + \int_n^{n+f} e^{\{x\}} dx$$

$$= n(e - 1) + (e^f - 1)$$

on comparing $\Rightarrow n = 10$

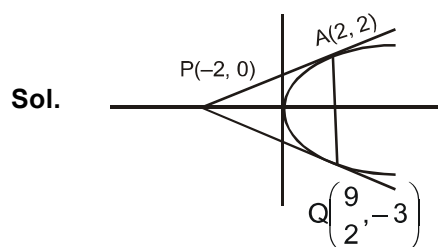
$$a = 10 + \ln 2$$

Topic : Definite Integral

Subtopic : Definite Integral

Level : Medium

2. Tangent and normal are drawn to parabola $y^2 = 2x$ at $A(2, 2)$. Tangent intersect on x-axis at P and normal meet parabola again at Q. Area of $\triangle PAQ$ is



$$\Delta = \frac{1}{2} \begin{vmatrix} -2 & 0 & 1 \\ 2 & 2 & 1 \\ \frac{9}{2} & -3 & 1 \end{vmatrix} = \frac{25}{2}$$

Topic : Parabola

Subtopic : Parabola

Level : Medium