

NUMERICAL INTEGRATION
PREVIOUS EAMCET BITS

1. The lines $x = \frac{\pi}{4}$ divides the area of the region bounded by $y = \sin x$, $y = \cos x$ and x-axis

$\left(0 \leq x \leq \frac{\pi}{2}\right)$ into two regions of area A_1 and A_2 . The $A_1 : A_2$: **[EAMCET 2009]**

- 1) 4 : 1 2) 3 : 1 3) 2 : 1 4) 1 : 1

Ans: 4

Sol. $A_1 = \int_0^{\pi/4} (\cos x - \sin x) dx$

$A_2 = \int_{\pi/4}^{\pi/2} (\sin x - \cos x) dx$

$\therefore A_1 : A_2 = 1 : 1$

2. The velocity of a particle which starts from rest is given by the following table

t (in seconds) :	0	2	4	6	8	10
v (in m/sec) :	0	12	16	20	35	60

The total distance travelled (in meters) by the particle in 10 seconds, using Trapezoidal rule is

given by **[EAMCET 2009]**

- 1) 113 2) 226 3) 143 4) 246

Ans: 2

Sol. Distance travelled = $\frac{h}{2} [(y_0 + y_n) + 2(y_1 + y_2 + \dots + y_{n-1})]$

3. The area (in square units) of the region bounded by the curve $2x = y^2 - 1$ and $x = 0$ is

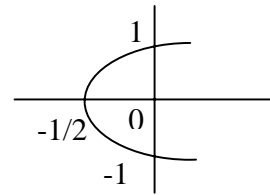
[EAMCET 2008]

- 1) $\frac{1}{3}$ 2) $\frac{2}{3}$ 3) 1 4) 2

Ans: 2

Sol. Area of the region = $-\int_{-1}^1 \frac{y^2 - 1}{2} dy = -\int_0^1 (y^2 - 1) dy$

$= -\left[\frac{y^3}{3} - y\right]_0^1 = \frac{2}{3}$ sq.units



4. The area (in square units) of the region enclosed by the curves $y = x^2$ and $y = x^3$ is

[EAMCET 2007]

- 1) $\frac{1}{12}$ 2) $\frac{1}{6}$ 3) $\frac{1}{3}$ 4) 1

Ans: 1

Sol. $x^2 = x^3$

$x^2 - x^3 = 0 \Rightarrow x^2(x - 1) = 0 \Rightarrow x = 0, 1$

Ans: 1

Sol. $h = \frac{b-a}{n} = \frac{9-1}{4} = 2$

x	1	3	5	7	9
y = x ²	1	9	25	49	81

$$\int_1^9 x^2 dx = \frac{2}{2} [(1+81) + 2(9+25+49)] = (82 + 166) = 248$$

10.

X	1	2	3	4
Y	0.7111	0.7222	0.7333	0.7444

Using the above table and trapezoidal rule, the approximately value of $\int_1^4 y dx$ is [EAMCET 2001]

- 1) 0.1833 2) 1.1833 3) 2.1833 4) 3.1833

Ans:3

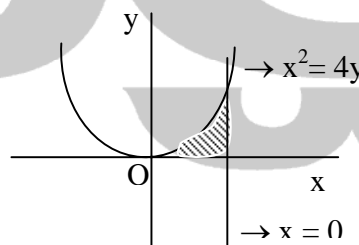
Sol. Trapezoidal rule = $\int_a^b f(x) dx = \frac{h}{2} [(y_0 + y_n) + 2(y_1 + y_2 + \dots + y_{n-1})]$

Where $h = \frac{b-a}{n}$

$$\therefore \int_1^4 y dx = \frac{1}{2} (0.7111 + 0.7444) + 2(0.7222 + 0.7333) = 2.1833$$

11. The area (in square units) of the region bounded by the curve $x^2 = 4y$, the line $x = 2$ and the X-axis is [EAMCET 2000]

- 1) 1 2) $\frac{2}{3}$
 3) $\frac{4}{3}$ 4) $\frac{8}{3}$



Ans: 2

Sol. $\int_0^2 y dx = \int_0^2 \frac{x^2}{4} dx = \frac{2}{3}$

12. The area (in square units) bounded by the curves $y = x^3$, $y = x^2$ and the ordinates $x = 1$, $x = 2$ is [EAMCET 2000]

- 1) $\frac{17}{12}$ 2) $\frac{12}{17}$ 3) $\frac{2}{7}$ 4) $\frac{7}{2}$

Ans: 1

Sol. $\int_1^2 (x^3 - x^2) dx = \frac{17}{12}$

