

ASSIGNMENT-03

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Course : MAT130

Section : 09

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Date : 23-03-2021.

Ans to the QNO-7.

(a)

From the graph, we get,

$$y = 4x$$

$$\Rightarrow x = \frac{y}{4}$$

$$y = x^2$$

$$\Rightarrow x = \sqrt{y}$$

So, the integral for the area will be

$$\int_0^{16} \sqrt{y} - \frac{y}{4} dy$$

$$= \int_0^{16} y^{\frac{1}{2}} - \frac{y}{4} dy = \int_0^{16} y^{\frac{1}{2}} dy - \frac{1}{4} \int_0^{16} y dy$$

$$= \left[\frac{2y^{\frac{3}{2}}}{3} - \frac{y^2}{8} \right]_0^{16}$$

$$= \left[\frac{2}{3} (16)^{\frac{3}{2}} - \frac{(16)^2}{8} \right] - \left[\frac{2}{3} (0)^{\frac{3}{2}} - \frac{(0)^2}{8} \right]$$

$$= \frac{128}{3} - 32 - 0 = \frac{128 - 96}{3} = \frac{32}{3}$$

(Ans.)

(b)

From the graph, we get,

$$x = -y$$

$$x = 110 - y^2$$

So, The integral for the area will be.

$$\int_0^{11} (110 - y^2 - (-y)) dy.$$

$$= \int_0^{11} (110 - y^2 + y) dy.$$

$$= \int_0^{11} 110 dy - \int_0^{11} y^2 dy + \int_0^{11} y dy.$$

$$= \left[110y - \frac{y^3}{3} + \frac{y^2}{2} \right]_0^{11}$$

$$= \left[110(11) - \frac{(11)^3}{3} + \frac{(11)^2}{2} \right] - \left[110(0) - \frac{(0)^3}{3} + \frac{(0)^2}{2} \right]$$

$$= 1210 - \frac{1331}{3} + \frac{121}{2} - 0$$

$$= \frac{7260 - 2662 + 363}{6} = \frac{4961}{6}$$

(Ans).

(c)

From the graph, we get,

$$x=y$$

$$x = \frac{1000}{y^2}$$

So, the integral for the area will be

$$\int_{10}^{20} y - \frac{1000}{y^2} dy$$

$$= \int_{10}^{20} y dy - \int_{10}^{20} \frac{1000}{y^2} dy$$

$$= \left[\frac{y^2}{2} + \frac{1000}{y} \right]_{10}^{20}$$

$$= \left[\frac{(20)^2}{2} + \frac{1000}{20} \right] - \left[\frac{(10)^2}{2} + \frac{1000}{10} \right]$$

$$= [200 + 50] - [50 + 100]$$

$$= 250 - 150 = 100 \text{ (Ans).}$$