

High School Assignment

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1. Problem

Draw a rough sketch and find the area bounded by curve $x^2 = y$ and $x + y = 2$

2. Solution

The given curve is $x^2 = y$ which is an upward parabola with vertex at origin. And line $x + y = 2$ i.e., $y = 2 - x$

$$x^2 = 2 - x \quad (1)$$

$$x^2 + x - 2 = 0 \quad (2)$$

$$(x + 2)(x - 1) = 0 \quad (3)$$

$$x = -2, \quad (4)$$

$$x = 1 \quad (5)$$

$$(6)$$

Now, $y = 2 - (-2) = 4$,

$y = 2 - 1 = 1$

Thus, the points of intersection are $(-2, 4)$ and $(1, 1)$

Required area of shaded region

$$= \int_{-2}^1 (2 - x) dx - \int_c^1 x^2 dx \quad (7)$$

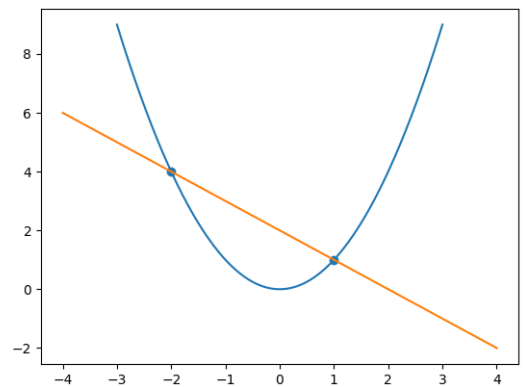
$$= \left[2x - \frac{x^2}{2} \right]_{-2}^1 - \left[\frac{x^3}{3} \right]_{-2}^1 \quad (8)$$

$$= 2 - \frac{1}{2} + 4 + \frac{4}{2} - \frac{1}{3} - \frac{8}{3} \quad (9)$$

$$= \frac{12 - 3 + 24 + 12 - 2 - 16}{6} \quad (10)$$

$$= \frac{9}{2} \text{ sq. units} \quad (11)$$

3. Rough Sketch



4. Answer

Area bounded is $\frac{9}{2}$ sq. units i.e., 4.5 sq. units