

## Answer on Question #50802 – Math – Calculus

Find the area between the curves  $y = 8 - x^2/2$  and  $y = 2 - x/2$ .

### Solution

#### Step 1 :

Given curves are  $y = 8 - x^2/2$  and  $y = 2 - x/2$ .

Equating both the curves we get

$$-\frac{x^2}{2} + \frac{x}{2} + 6 = 0$$

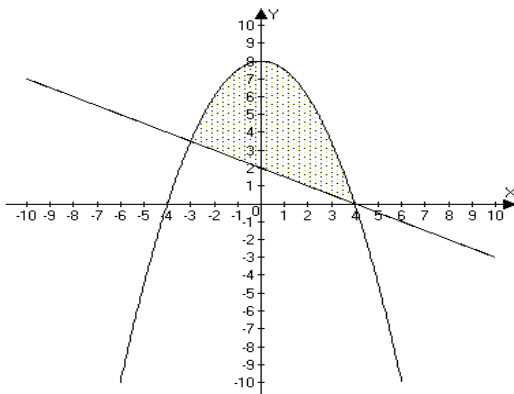
$$x^2 - x - 12 = 0$$

$$D = 1 - 4 \cdot (-1) \cdot 12 = 49$$

$$x_{1,2} = \frac{1 \pm \sqrt{49}}{2}$$

$x = -3, 4$  are the two intersecting points.

#### Step 2 : Visual representation of the region:



**Step 3 :** Area of the region bounded by these curves at intersection points is given by

$$S = \int_{-3}^4 \left( 8 - \frac{x^2}{2} - \left( 2 - \frac{x}{2} \right) \right) dx = \left( 8x - \frac{x^3}{6} - 2x + \frac{x^2}{4} \right) \Big|_{-3}^4 = \left( -\frac{x^3}{6} + \frac{x^2}{4} + 6x \right) \Big|_{-3}^4 = \left( -\frac{4^3}{6} + \frac{4^2}{4} + 24 \right) - \left( -\frac{(-3)^3}{6} + \frac{(-3)^2}{4} + 6(-3) \right) = \frac{343}{12} = 28 \frac{7}{12}.$$

**Answer:**  $28 \frac{7}{12}$ .