

## Answer on Question #50972 – Math – Calculus

### Question

Find the area of the region bounded by the graph of curves

$$y = x + 6, \quad y = x^3, \quad y = -\frac{x}{2}$$

### Solution

The graph of these curves looks like this one:

Blue line is  $y = x + 6$ , green is

$y = -\frac{x}{2}$ , orange curve is  $y = x^3$ .

The point of intersection of blue and green line is determined by

$$x_1 + 6 = -\frac{x_1}{2}$$

$$x_1 = -4$$

The point of intersection of blue and orange line is determined by

$$x_2 + 6 = x_2^3 \rightarrow x_2 = 2$$

Green and orange curves intersect at the point

$$x_3^3 = -\frac{x_3}{2} \rightarrow x_3 = 0$$

Therefore, the area of bounded region is

$$S = \int_{-4}^2 (x + 6) dx - \int_{-4}^0 \left(-\frac{x}{2}\right) dx - \int_0^2 x^3 dx$$

Evaluate it:

$$S = \frac{(2 + 6)^2}{2} - \frac{(-4 + 6)^2}{2} + \frac{0^2}{4} - \frac{(-4)^2}{4} - \frac{2^4}{4} + \frac{0^4}{4} = 22$$

**Answer:**  $S = 22$ .

