

Area Between Two Curves

The equations of the parabolas are:

$$y = \frac{3}{2}x^2 - 4x - 1 \quad \text{and} \quad y = -\frac{1}{2}x^2 + x + 2$$

Calculate the shaded area.

First find the points of intersection.

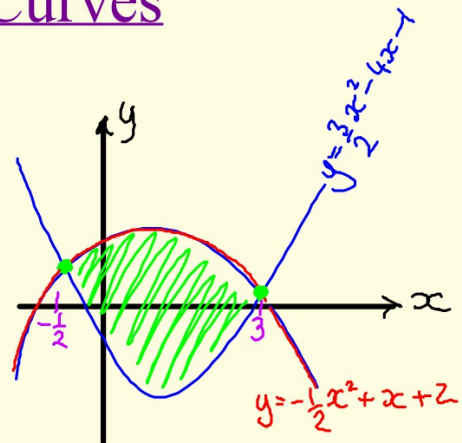
Solve simultaneously $y = y$
top = bottom

$$-\frac{1}{2}x^2 + x + 2 = \frac{3}{2}x^2 - 4x - 1$$

$$-2x^2 + 5x + 3 = 0$$

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

$$x = -\frac{1}{2} \quad x = 3$$



$$\int_{-\frac{1}{2}}^3 -2x^2 + 5x + 3 \, dx = \left[-\frac{2}{3}x^3 + \frac{5}{2}x^2 + 3x \right]_{-\frac{1}{2}}^3$$

$$= \left[-\frac{2}{3}(3)^3 + \frac{5}{2}(3)^2 + 9 \right] - \left[-\frac{2}{3}\left(-\frac{1}{2}\right)^3 + \frac{5}{2}\left(-\frac{1}{2}\right)^2 - \frac{3}{2} \right] =$$

$$= (-18 + \frac{45}{2} + 9) - \left(\frac{1}{12} + \frac{5}{8} - \frac{3}{2} \right) = 13\frac{1}{2} + \frac{19}{24} = 14\frac{7}{24}$$

$$\text{Area} = \underline{\underline{14\frac{7}{24} \text{ units}^2}}$$