

## Area Between Curves

Date \_\_\_\_\_ Period \_\_\_\_\_

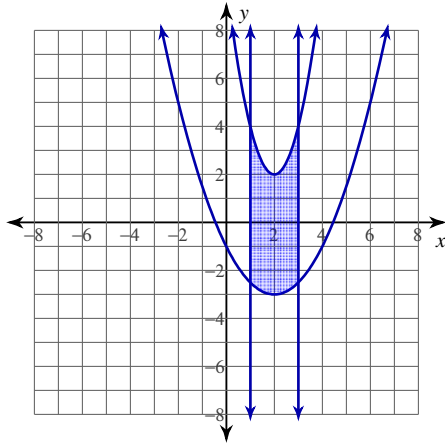
For each problem, find the area of the region enclosed by the curves.

1)  $y = 2x^2 - 8x + 10$

$$y = \frac{x^2}{2} - 2x - 1$$

$x = 1$

$x = 3$



$$\int_1^3 \left( 2x^2 - 8x + 10 - \left( \frac{x^2}{2} - 2x - 1 \right) \right) dx$$

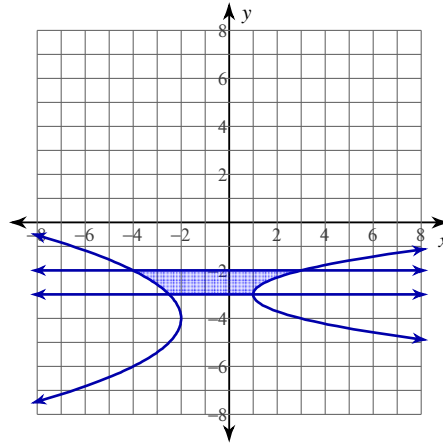
$$= 11$$

2)  $x = 2y^2 + 12y + 19$

$$x = -\frac{y^2}{2} - 4y - 10$$

$y = -3$

$y = -2$

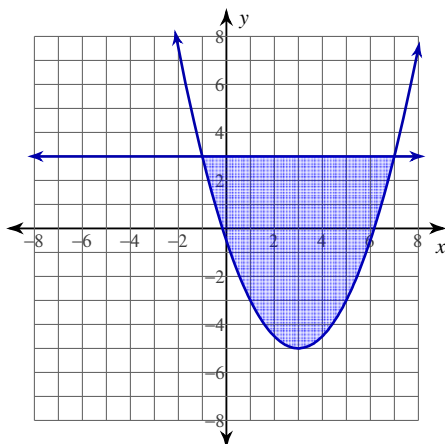


$$\int_{-3}^{-2} \left( 2y^2 + 12y + 19 - \left( -\frac{y^2}{2} - 4y - 10 \right) \right) dy$$

$$= \frac{29}{6} \approx 4.833$$

3)  $y = \frac{x^2}{2} - 3x - \frac{1}{2}$

$y = 3$

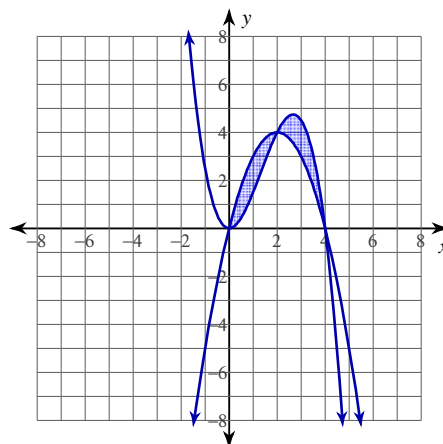


$$\int_{-1}^7 \left( 3 - \left( \frac{x^2}{2} - 3x - \frac{1}{2} \right) \right) dx$$

$$= \frac{128}{3} \approx 42.667$$

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

$y = -x^2 + 4x$



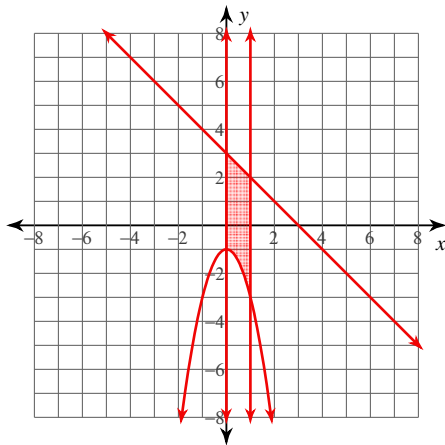
$$\int_0^2 \left( -x^2 + 4x - \left( -\frac{x^3}{2} + 2x^2 \right) \right) dx +$$

$$\int_2^4 \left( -\frac{x^3}{2} + 2x^2 - (-x^2 + 4x) \right) dx$$

$$= 4$$

For each problem, find the area of the region enclosed by the curves. You may use the provided graph to sketch the curves and shade the enclosed region.

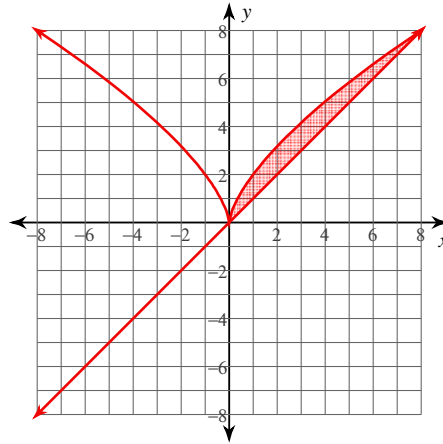
5)  $y = -2x^2 - 1$   
 $y = -x + 3$   
 $x = 0$   
 $x = 1$



$$\int_0^1 (-x + 3 - (-2x^2 - 1)) dx$$

$$= \frac{25}{6} \approx 4.167$$

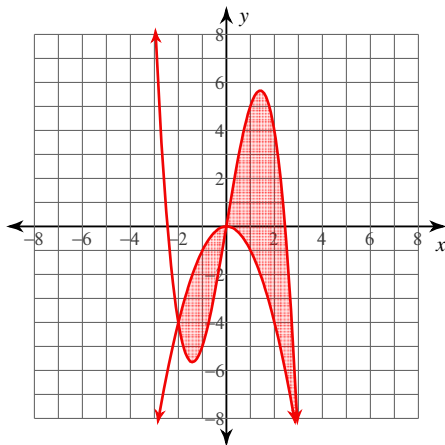
6)  $y = 2\sqrt[3]{x^2}$   
 $y = x$



$$\int_0^8 (2\sqrt[3]{x^2} - x) dx$$

$$= \frac{32}{5} = 6.4$$

7)  $y = -x^3 + 6x$   
 $y = -x^2$

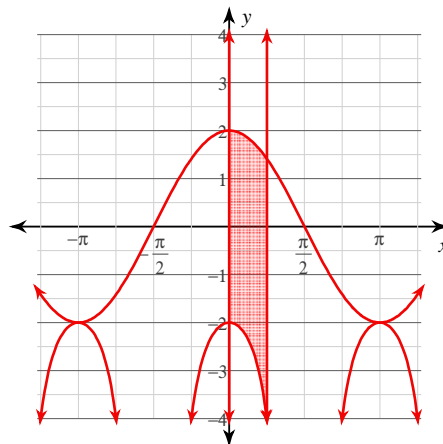


$$\int_{-2}^0 (-x^2 - (-x^3 + 6x)) dx +$$

$$\int_0^3 (-x^3 + 6x + x^2) dx$$

$$= \frac{253}{12} \approx 21.083$$

8)  $y = -2 \cdot \sec^2 x$   
 $y = 2\cos x$   
 $x = 0$   
 $x = \frac{\pi}{4}$



$$\int_0^{\frac{\pi}{4}} (2\cos x + 2 \cdot \sec^2 x) dx$$

$$= 2 + \sqrt{2} \approx 3.414$$