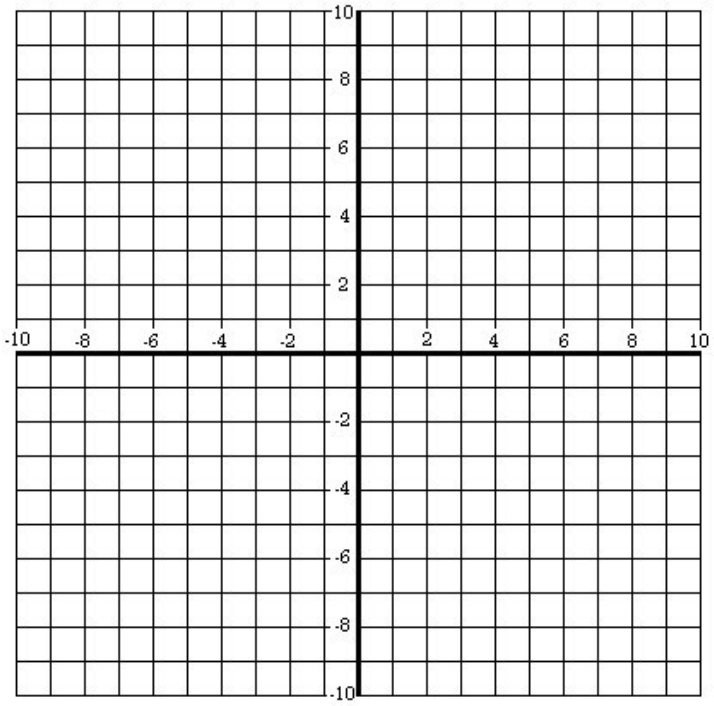
Calculus Lesson 611 Area between two curves

Consider: $y = x$ and $y = -x^2 + 2$

Sketch and find the intersection points:



Method 1: Find the area of each using separate Integrals and subtract the areas.

Method 2: Subtract inside a single integral.

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Key

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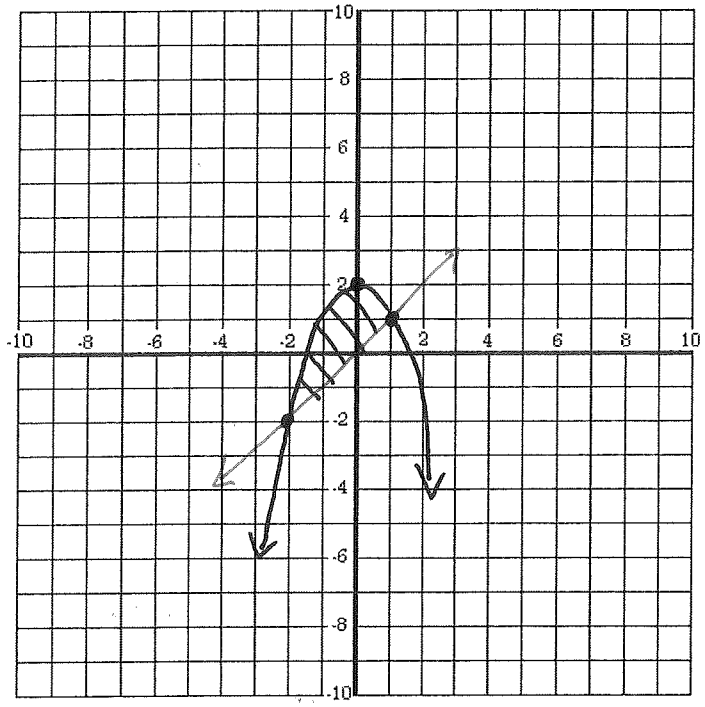


Method 1: Find the area of each using separate Integrals and subtract the areas.

Quad is on top! Quad - Linear

$$\int_{-2}^{1}(-x^2+2)dx - \int_{-2}^{1} x\,dx$$

Method 2: Subtract inside a single integral.

$$\int_{-2}^{1}\left[(-x^2+2)-x\right]dx = 4.5$$

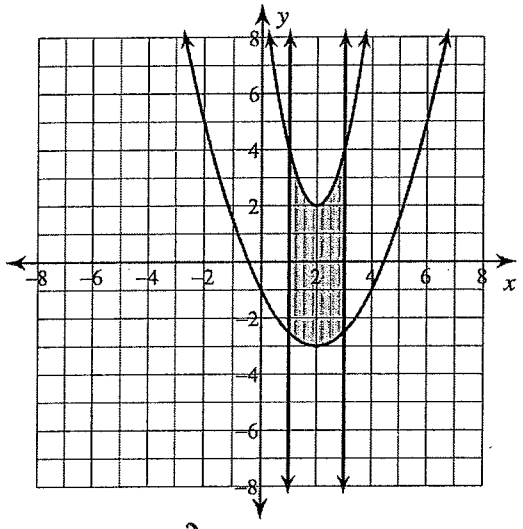
For each problem, find the area of the region enclosed by the curves.

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

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

$x = 1$

$x = 3$



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

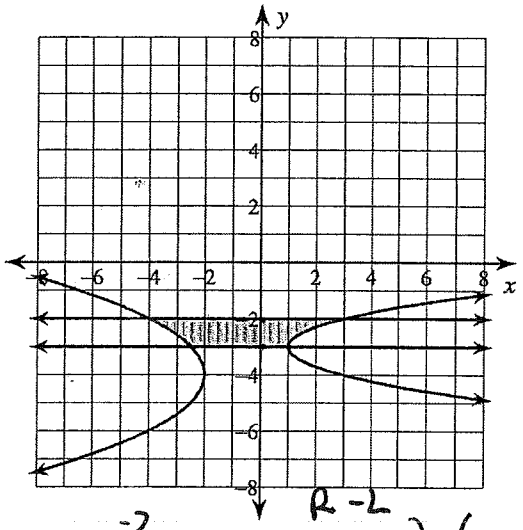
11

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

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

$y = -3$

$y = -2$



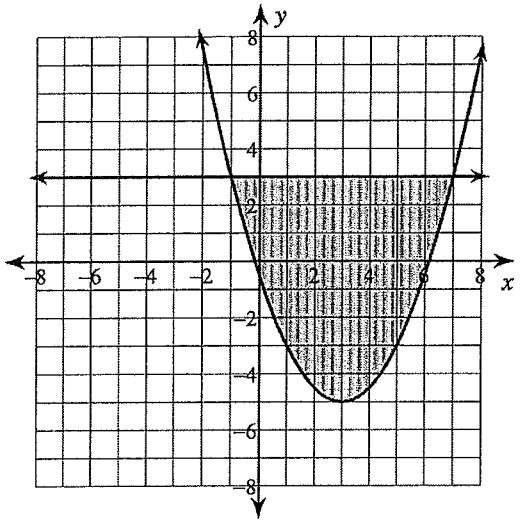
R-2

$\int_{-3}^{-2} \left[(2y^2 + 12y + 19) - \left(-\frac{1}{2}y^2 - 4y - 10\right)\right] dy$

4.833

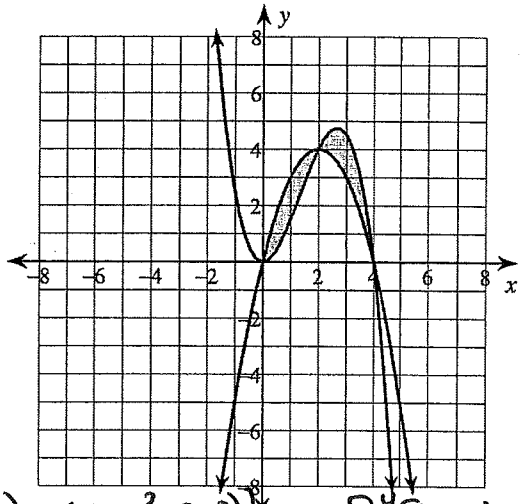
3) $y = \frac{x^2}{2} - 3x - \frac{1}{2}$

$y = 3$



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

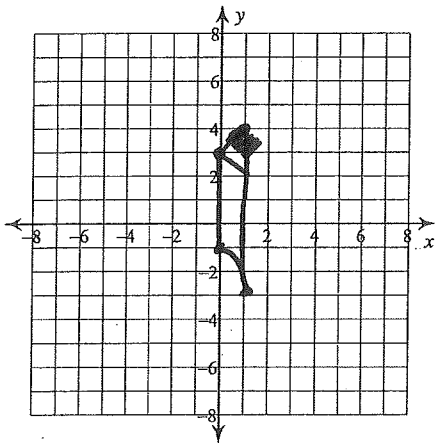
$y = -x^2 + 4x$



$\int_0^2 \left[(-x^2 + 4x) - \left(\frac{1}{2}x^3 + 2x^2\right)\right] dx + \int_2^4 \left[\left(-\frac{1}{2}x^3 + 2x^2\right) - (x^2 + 4x)\right] dx$

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.

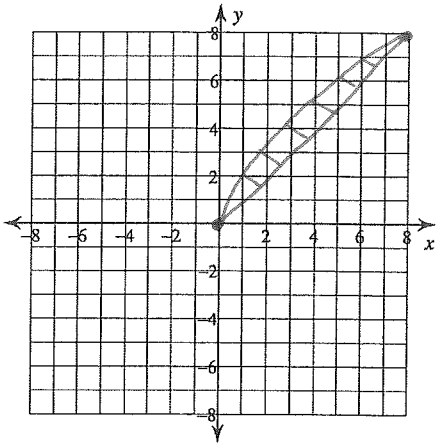
5) $y = -2x^2 - 1$
$y = -x + 3$
$x = 0$
$x = 1$



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

$4.1\overline{6}$

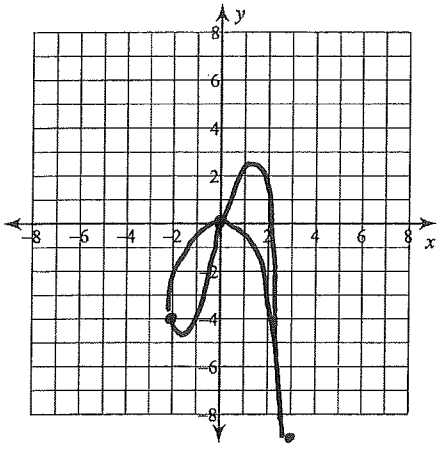
6) $y = 2\sqrt[3]{x^2}$
$y = x$



$\int_0^8 [2x^{2/3} - x]\,dx$

6.4

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



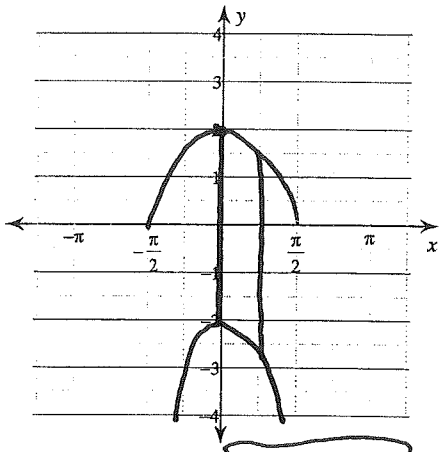
$\int_{-2}^{3} |(-x^3+6x)-(-x^2)|\,dx$

21.083

OR

$\int_{-2}^{0} [-x^2-(-x^3+6x)]\,dx + \int_0^3 [(-x^3+6x)+x^2]\,dx$

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



3.414