Calculus

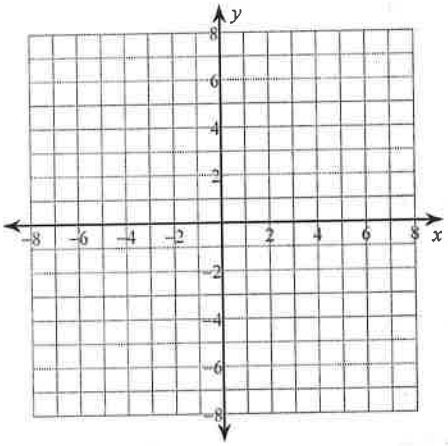
Name_____

Area between two curves and their graphs

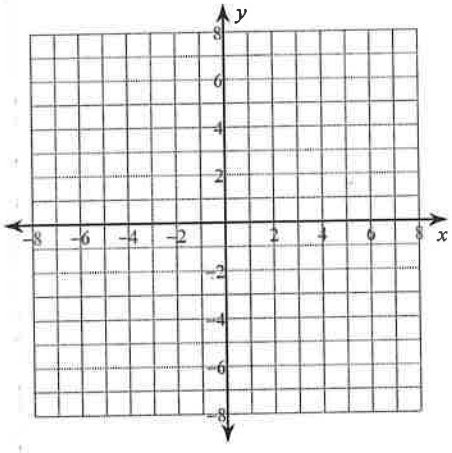
Date_____ Period____

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.

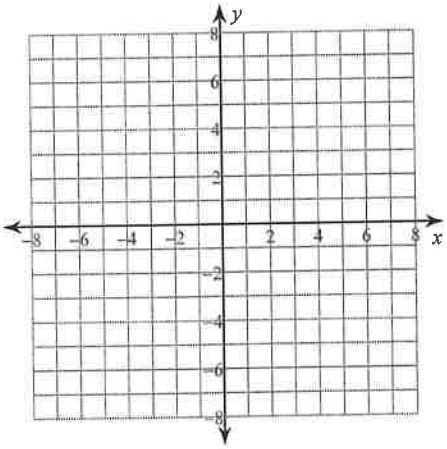
1) $y = -x^2 + 6x - 7,\ y = -2,$
$x = 1,\ x = 6$



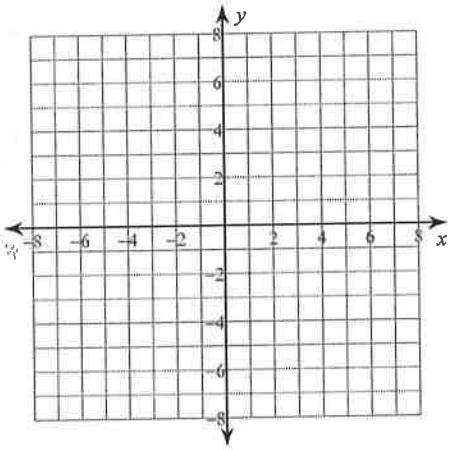
2) $y = x^2 + 2x - 3,\ y = x^2 - 3,$
$x = -3,\ x = 2$



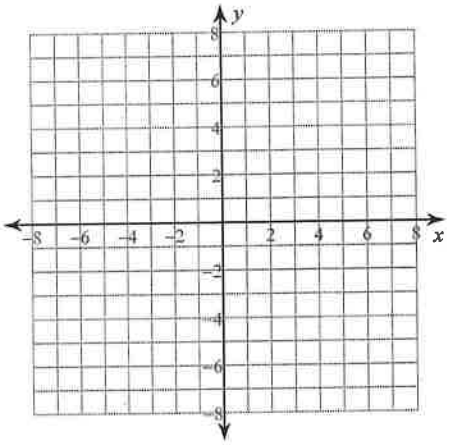
3) $y = -2x^2 - 8x - 6,\ y = 2x + 2,$
$x = -4,\ x = 0$



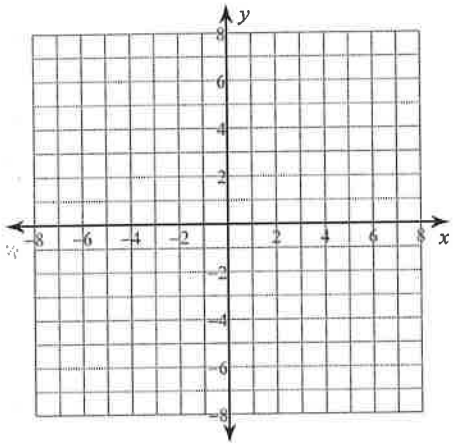
4) $y = -2x^2 + 1,\ y = -\dfrac{x^2}{2} + 3x - \dfrac{7}{2},$
$x = -1,\ x = 2$



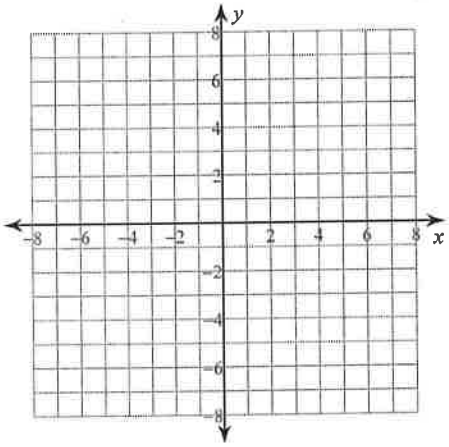
5) $y = x^3 + x^2 - 4x,\ \ y = x^2$



6) $y = -\dfrac{x^3}{2} - \dfrac{x^2}{2} + 3x,\ \ y = 0$

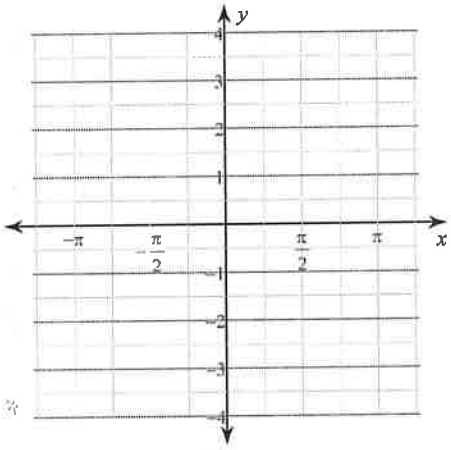


7) $y = -x^3 - x^2 + 4x,\ \ y = -2x$



8) $y = -2\cos x,\ \ y = 2\cos x,$

$x = -\dfrac{\pi}{4},\ \ x = \pi$



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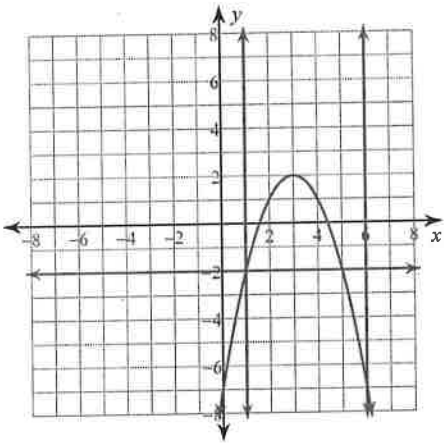
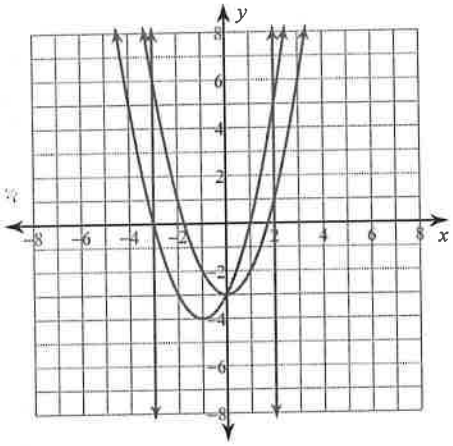


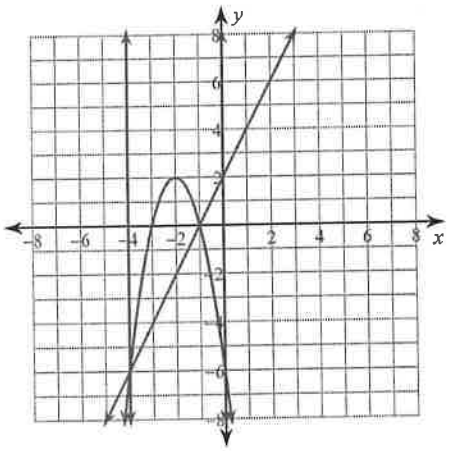
$$\int_1^5 \left(-x^2 + 6x - 5\right) dx +$$
$$\int_5^6 \left(-2 - \left(-x^2 + 6x - 7\right)\right) dx$$
$$= 13$$

2) $y = x^2 + 2x - 3,\ y = x^2 - 3,$
$x = -3,\ x = 2$



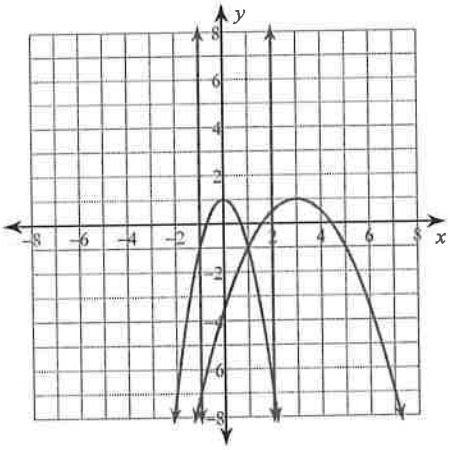
$$\int_{-3}^0 \left(x^2 - 3 - \left(x^2 + 2x - 3\right)\right) dx +$$
$$\int_0^2 \left(x^2 + 2x - 3 - \left(x^2 - 3\right)\right) dx$$
$$= 13$$

3) $y = -2x^2 - 8x - 6,\ y = 2x + 2,$
$x = -4,\ x = 0$



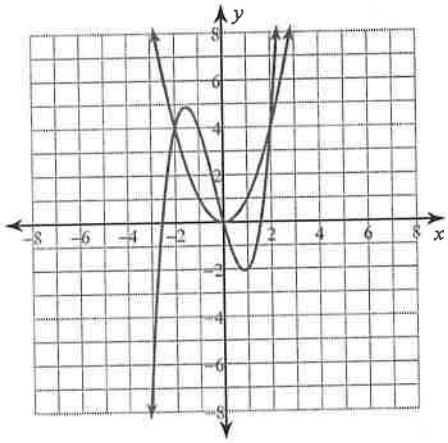
$$\int_{-4}^{-1} \left(-2x^2 - 8x - 6 - (2x + 2)\right) dx +$$
$$\int_{-1}^0 \left(2x + 2 - \left(-2x^2 - 8x - 6\right)\right) dx$$
$$= \frac{38}{3} \approx 12.667$$

4) $y = -2x^2 + 1,\ y = -\frac{x^2}{2} + 3x - \frac{7}{2},$
$x = -1,\ x = 2$



$$\int_{-1}^1 \left(-2x^2 + 1 - \left(-\frac{x^2}{2} + 3x - \frac{7}{2}\right)\right) dx +$$
$$\int_1^2 \left(-\frac{x^2}{2} + 3x - \frac{7}{2} - \left(-2x^2 + 1\right)\right) dx$$
$$= \frac{23}{2} = 11.5$$

5) $y = x^3 + x^2 - 4x,\ \ y = x^2$

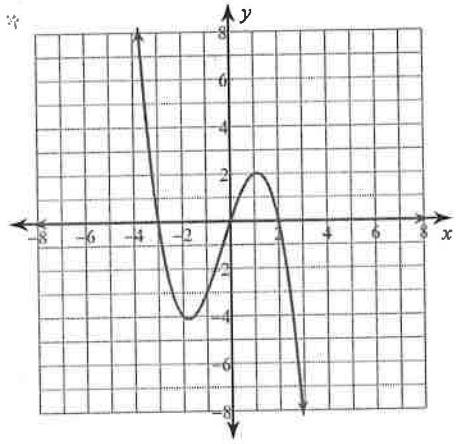


$$\int_{-2}^{0} (x^3 - 4x)\, dx +$$

$$\int_{0}^{2} (x^2 - (x^3 + x^2 - 4x))\, dx$$

$$= 8$$

6) $y = -\dfrac{x^3}{2} - \dfrac{x^2}{2} + 3x,\ \ y = 0$

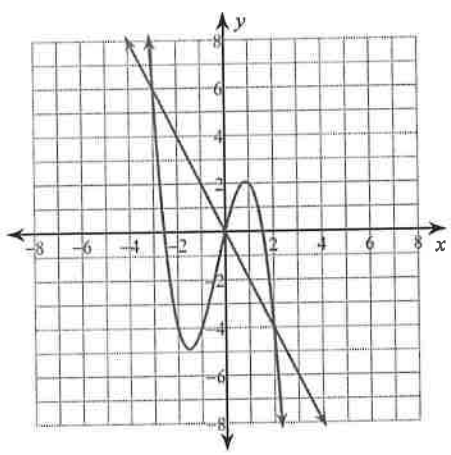


$$\int_{-3}^{0} -\left(-\frac{x^3}{2} - \frac{x^2}{2} + 3x\right) dx +$$

$$\int_{0}^{2} \left(-\frac{x^3}{2} - \frac{x^2}{2} + 3x - 0\right) dx$$

$$= \frac{253}{24} \approx 10.542$$

7) $y = -x^3 - x^2 + 4x,\ \ y = -2x$



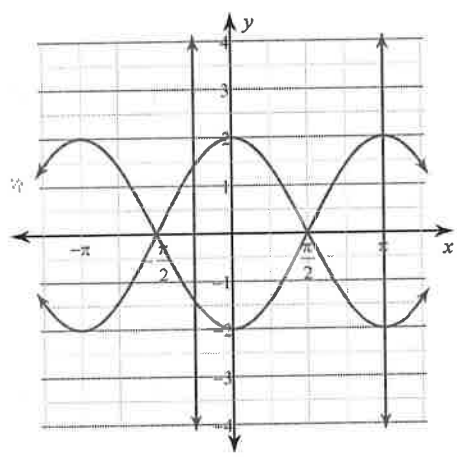
$$\int_{-3}^{0} (-2x - (-x^3 - x^2 + 4x))\, dx +$$

$$\int_{0}^{2} (-x^3 - x^2 + 4x + 2x)\, dx$$

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

8) $y = -2\cos x,\ \ y = 2\cos x,$

$x = -\dfrac{\pi}{4},\ \ x = \pi$



$$\int_{-\frac{\pi}{4}}^{\frac{\pi}{2}} (2\cos x + 2\cos x)\, dx +$$

$$\int_{\frac{\pi}{2}}^{\pi} (2\cos x + 2\cos x)\, dx$$

$$= 8 + 2\sqrt{2} \approx 10.828$$