Find the area of the regions enclosed by the lines and curves

24. $x - y^2 = 0$ and $x + 2y^2 = 3$

$\boxed{y = \pm\sqrt{x}}$

$\boxed{y = \pm\sqrt{\frac{x-3}{-2}}}$

$\boxed{x = y^2}$ $\quad x = 3 - 2y^2$

$y^2 = 3 - 2y^2$

$+2y^2 \quad +2y^2$

$3y^2 = 3$

$y^2 = 1$

$y = \pm 1$

$A = -\int_{-1}^{1} y^2 - (3 - 2y^2)$

$A = -\int_{-1}^{1} 3y^2 - 3\,dy = -\left[y^3 - 3y\right]_{-1}^{1} = -\left[(-2) - (2)\right]$

$= +4$

26. $4x^2 + y = 4$ and $x^4 - y = 1$

$y = 4 - 4x^2$

$-y = 1 - x^4$

$y = x^4 - 1$

$4 - 4x^2 = x^4 - 1$

$-4 + 4x \quad -4 + 4x^2$

$0 = x^4 + 4x^2 - 5$

$0 = (x^2 + 5)(x^2 - 1)$

$x^2 + 5 = 0 \quad x^2 - 1 = 0$

$x^2 \neq -5 \quad x^2 = 1$

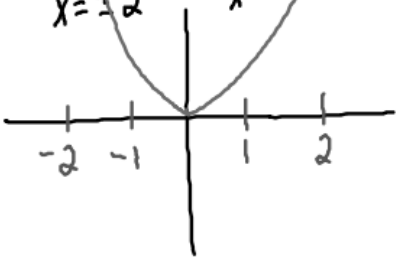
$x = \pm 1$

$A = \int_{-1}^{1} 4 - 4x^2 - (x^4 - 1) = 6.933$

Find the area of the regions enclosed by the lines and curves

18. $y_2 = x^4 - 4x^2 + 4$ and $y_1 = x^2$

$$x^4 - 4x^2 + 4 = x^2$$
$$-x^2 \qquad -x^2$$
$$x^4 - 5x^2 + 4 = 0$$
$$(x^2 - 4)(x^2 - 1) = 0$$
$$x = \pm 2 \qquad x = \pm 1$$



$$\int_{-2}^{-1} (y_1 - y_2)\,dy + \int_{-1}^{1} (y_2 - y_1)\,dy + \int_{1}^{2} (y_1 - y_2)\,dy$$

23. $y^2 - 4x = 4$ and $4x - y = 16$

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

$$\frac{4x}{4} = \frac{16}{4} + \frac{y}{4}$$
$$\boxed{x = 4 + \frac{1}{4}y}$$

$$\int_{-4}^{5} \left(4 + \frac{1}{4}y\right) - \left(-1 + \frac{1}{4}y^2\right) = 30.375$$

$$\left(-1 + \frac{1}{4}y^2 = 4 + \frac{1}{4}y\right)4$$
$$-4 + y^2 = 16 + y$$
$$-16 \qquad -16$$
$$y^2 - 20 = y$$
$$-y \qquad -y$$
$$y^2 - y - 20 = 0$$
$$(y - 5)(y + 4)$$
$$y = 5 \quad y = -4$$