**Find the area of each region. Use a piece of graph paper to graph each region.**

1. The region in the first quadrant above the line $y = 3x - 2$ and below the line $y = 4$.

2. The region between the curve $y = x^3$ and the lines $y = -x$ and $y = 1$.

3. The region between the parabola $y = 4x^2$ and the line $y = 2x - 3$ from $x = 0$ to $x = 1$.

4. The region between the curves $y = \sqrt{x}$ and $y = 1$ and $x = 4$.

5. The region between the curves $y = \sin x$ and $y = \cos x$ from $x = 0$ to $x = (\pi/4)$.

6. The region between the parabola $x = -y^2$ and the line $y = x + 6$.
   (Hint: You must integrate with respect to y)

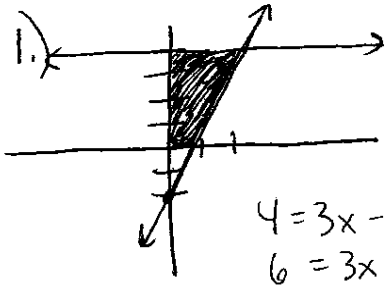
7. The region between the parabola $y = x^2 - x - 6$ and the line $y = -4$.

8. The region between the curves $y = \sqrt{x}$ and $y = x^3$.

9. The region bounded by the parabolas $y = x^2$ and $y = -x^2 + 6x$.

10. The region under the curve $y = \sqrt{x}$ and above the x-axis on the interval $[0, 4]$.

1.)



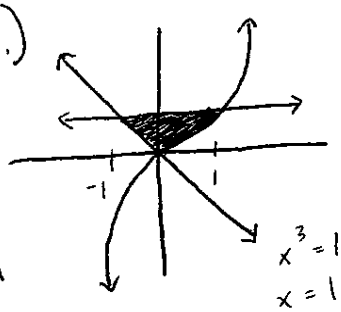
$4 = 3x - 2$
$6 = 3x$
$x = 2$

$$A = \int_0^{2/3} 4\,dx + \int_{2/3}^{2} 4 - (3x-2)\,dx \qquad 6 - 3x$$

$$4x\Big|_0^{2/3} + 6x - \frac{3}{2}x^2\Big|_{2/3}^{2} =$$

$$\frac{8}{3} + \left(6 - \frac{10}{3}\right) = \frac{8}{3} + \frac{8}{3} = \boxed{\frac{16}{3}}$$

2.)



$-x = 1$
$x = -1$
$x^3 = 1$
$x = 1$

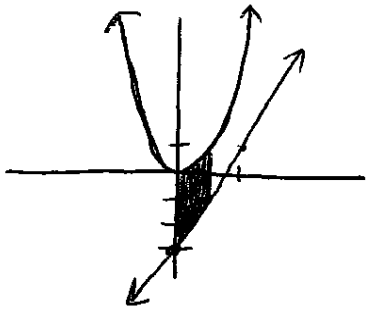
$$A = \int_{-1}^{0} 1 + x\,dx + \int_{0}^{1} 1 - x^3\,dx$$

$$x + \frac{x^2}{2}\Big|_{-1}^{0} \qquad x - \frac{x^4}{4}\Big|_{0}^{1}$$

$$0 + \frac{1}{2} \qquad \frac{3}{4} - 0$$

$$\frac{1}{2} + \frac{3}{4} = \boxed{\frac{5}{4}}$$

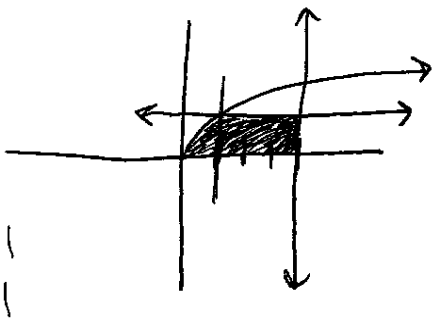
3.)



$$A = \int_0^1 4x^2 - 2x + 3\,dx$$

$$\frac{4}{3}x^3 - x^2 + 3x\Big|_0^1 = \frac{10}{3} - 0 = \boxed{\frac{10}{3}}$$

4.)



$\sqrt{x} = 1$

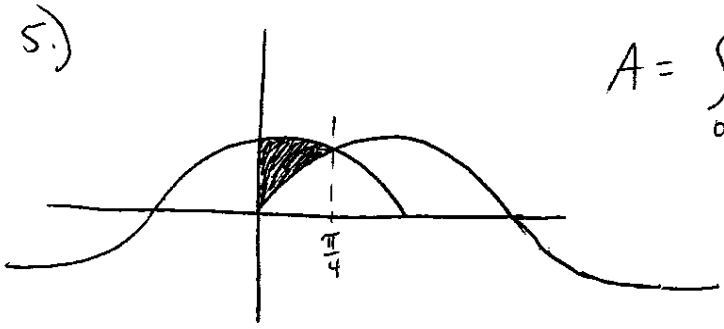
$x = 1$

$$A = \int_0^1 \sqrt{x}\,dx + \int_1^4 1\,dx$$

$$\frac{2}{3}x^{3/2}\Big|_0^1 + x\Big|_1^4$$

$$\frac{2}{3} + 3 = \boxed{\frac{11}{3}}$$

5.)

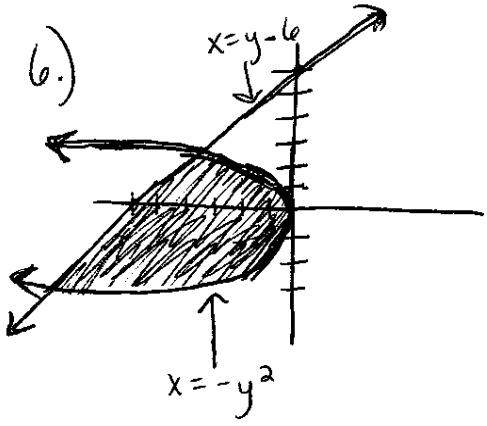



$$A = \int_0^{\pi/4} \cos x - \sin x\,dx$$

$$\sin x + \cos x\Big|_0^{\frac{\pi}{4}}$$

$$\boxed{\sqrt{2} - 1}$$

6.)




$$A = \int_{-3}^{2} -y^2 - y + 6\,dy$$

$$-\frac{y^3}{3} - \frac{y^2}{2} + 6y\Big|_{-3}^{2}$$

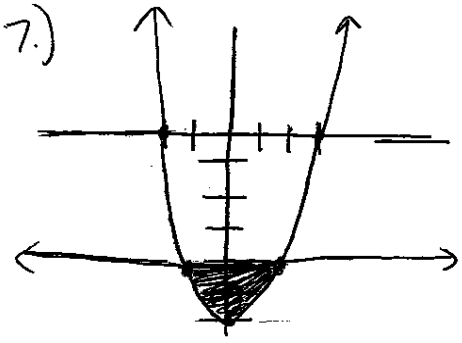
$$\frac{22}{3} + \frac{27}{2} = \boxed{\frac{125}{6}}$$

$$-y^2 = y - 6 \rightarrow y^2 + y - 6 = 0$$

$$(y+3)(y-2) = 0$$

$$y = -3, 2$$

7.)



$$A = \int_{-1}^{2} x^2 - x - 2\,dx$$

$$\frac{x^3}{3} - \frac{x^2}{2} - 2x\Big|_{-1}^{2}$$

$$\frac{-10}{3} - \frac{7}{6} = \boxed{\frac{-9}{2}}$$

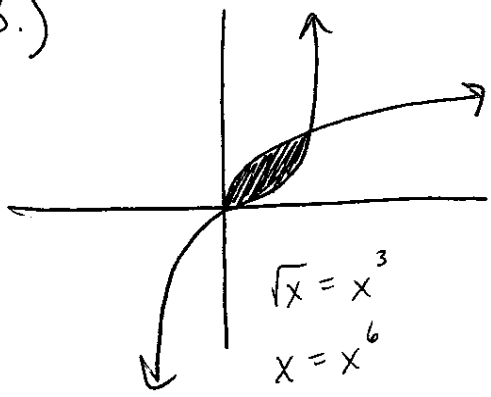
$$x^2 - x - 6 = -4$$

$$x^2 - x - 2 = 0$$

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

$$x = -1, 2$$

8.)



$\sqrt{x} = x^3$

$x = x^6$

$x^6 - x = 0$

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

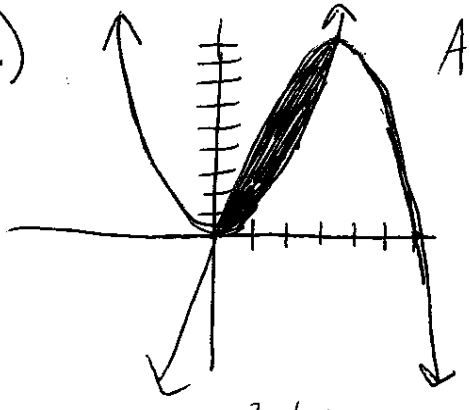
$x = 0, 1$

$$A = \int_0^1 \sqrt{x} - x^3 \, dx$$

$$\frac{2}{3}x^{3/2} - \frac{x^4}{4}\Big|_0^1$$

$$\boxed{\frac{5}{12}}$$

9.)



$x^2 = -x^2 + 6x$

$2x^2 = 6x$

$2x^2 - 6x = 0$

$2x(x - 3) = 0$

$x = 0, 3$

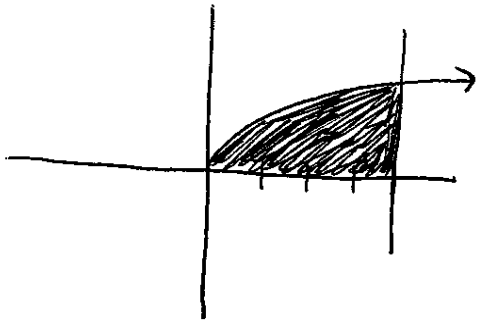
$$A = \int_0^3 -x^2 + 6x - x^2 \, dx$$

$$= \int_0^3 -2x^2 + 6x \, dx$$

$$-\frac{2}{3}x^3 + 3x^2\Big|_0^3$$

$9 - 0 = \boxed{9}$

10.)



$$A = \int_0^4 \sqrt{x} \, dx$$

$$\frac{2}{3}x^{3/2}\Big|_0^4$$

$$\boxed{\frac{16}{3}}$$