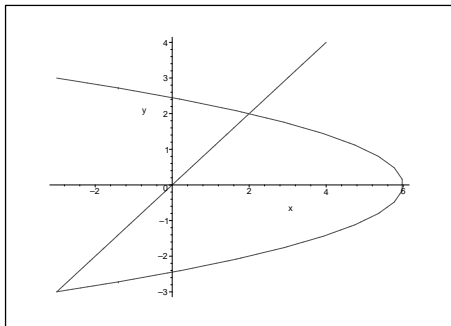


Math 112.01 – Quiz 4 and Solutions

1) Find the area of the region enclosed by $x = 6 - y^2$ and $y = x$.

First sketch the region:



We see that integrating with respect to y is more convenient in this problem. Find the (y -coordinates) points of intersection: $y = -3$ and $y = 2$. Then the area is given by the integral:

$$\int_{-3}^2 (6 - y^2 - y) dy = \frac{125}{6}$$

2) Find the length of the arc $y = 2x^{\frac{3}{2}}$, $0 \leq x \leq 1$

Remember the arc length formula: $\int_0^1 \sqrt{1 + (y'(x))^2} dx$

Here, $y' = 3x^{\frac{1}{2}}$ so $(y')^2 = 9x$. So we need to compute $\int_0^1 \sqrt{1 + 9x} dx$.

We make the substitution $u = 1 + 9x$, then

$$\int_0^1 \sqrt{1 + 9x} dx = \frac{1}{9} \int_9^{10} u^{\frac{1}{2}} du = \frac{2}{27} (10^{\frac{3}{2}} - 9^{\frac{3}{2}})$$