Problem 1. Convert the equation

$$r = \sec(\theta)\tan(\theta)$$

from polar coordinates to Cartesian coordinates.

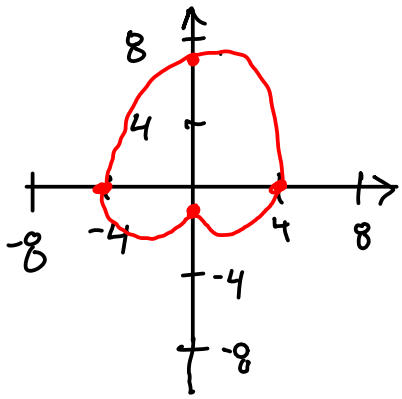
$\cos(\theta) = \frac{x}{r}$, $\sin\theta = \frac{y}{r}$

$r = \frac{\sin(\theta)}{\cos^2(\theta)} \Rightarrow r = \frac{y/r}{(x/r)^2} \Rightarrow x^2 r = yr$

$y = x^2$

Problem 2. Find the area of the region bounded by the curve

$$r = 4 + 3\sin(\theta)$$



$A = \int_0^{2\pi} \frac{1}{2} r^2 d\theta$

$= \int_0^{2\pi} \frac{1}{2}(4+3\sin\theta)^2 d\theta$

$= \int_0^{2\pi} 2 + 12\sin\theta + \frac{9}{2}\sin^2\theta \, d\theta$

$= \int_0^{2\pi} \frac{13}{4} + 12\sin\theta - \frac{9}{4}\sin(2\theta)\, d\theta$

$= \frac{13\pi}{2}$