Converting polar equations

To convert polar equations to rectangular equations, we'll use the following conversion formulas.

$$x = r\cos\theta$$

$$y = r\sin\theta$$

$$r^2 = x^2 + y^2$$

Example

Convert the polar equation to a rectangular equation.

$$r = 3\cos\theta$$

Modify the conversion formula $x = r\cos\theta$.

$$x = r\cos\theta$$

$$\cos\theta = \frac{x}{r}$$

Plug this into the given polar equation.

$$r = 3\left(\frac{x}{r}\right)$$

$$r^2 = 3x$$

Use $r^2 = x^2 + y^2$.

$$x^2 + y^2 = 3x$$

$$x^2 - 3x + y^2 = 0$$

Once we've eliminated all r and θ variables, and replaced them with x and y variables, we're done with the conversion.