Converting rectangular equations

To convert rectangular equations to polar 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 rectangular equation to a polar equation.

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

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

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

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

Use $x = r\cos\theta$ and $y = r\sin\theta$.

$$r^2 - 3r\cos\theta + 2r\sin\theta = 0$$

$$r^2 = 3r\cos\theta - 2r\sin\theta$$

$$r = 3\cos\theta - 2\sin\theta$$

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