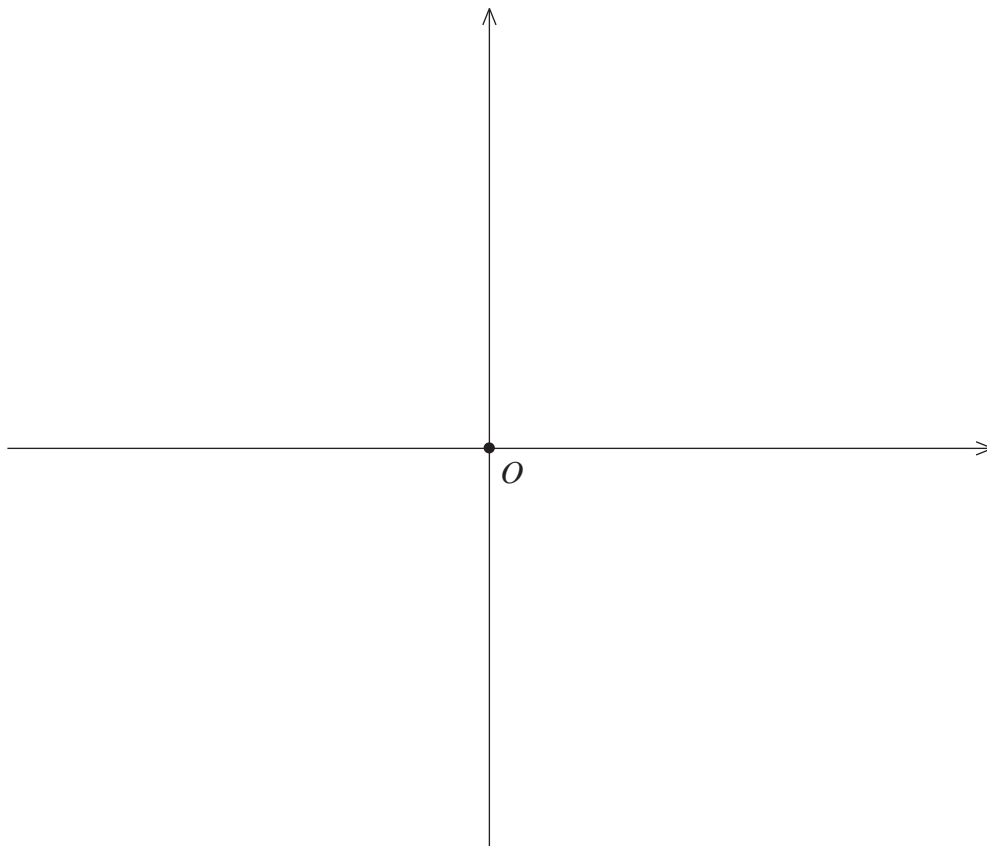**Quiz**   **Name**

1. Consider an x-y and a polar coordinate system simultaneously (with the polar coordinate system being O and the positive x-axis). Show that the graph of the function $r = f(\theta) = \frac{2}{\cos\theta + 2\sin\theta}$ is a line by converting the equation $r = \frac{2}{\cos\theta + 2\sin\theta}$ to Cartesian coordinates. Plot the points on the graph of $r = f(\theta) = \frac{2}{\cos\theta + 2\sin\theta}$ for $\theta = 0$ and $\theta = \frac{\pi}{2}$. Sketch the line in the space provided.

2. Use the graph above (rather than an attempt to find and anti-derivative) to evaluate the integral

$$\int_0^{\frac{\pi}{2}} \frac{1}{2} \frac{2^2}{(\cos\theta + 2\sin\theta)^2}\, d\theta = \int_0^{\frac{\pi}{2}} \frac{2}{(\cos\theta + 2\sin\theta)^2}\, d\theta.$$

Formulas: $L = \int_a^b \sqrt{f(\theta)^2 + f'(\theta)^2}\, d\theta$ and $A = \int_a^b \frac{1}{2} f(\theta)^2\, d\theta$