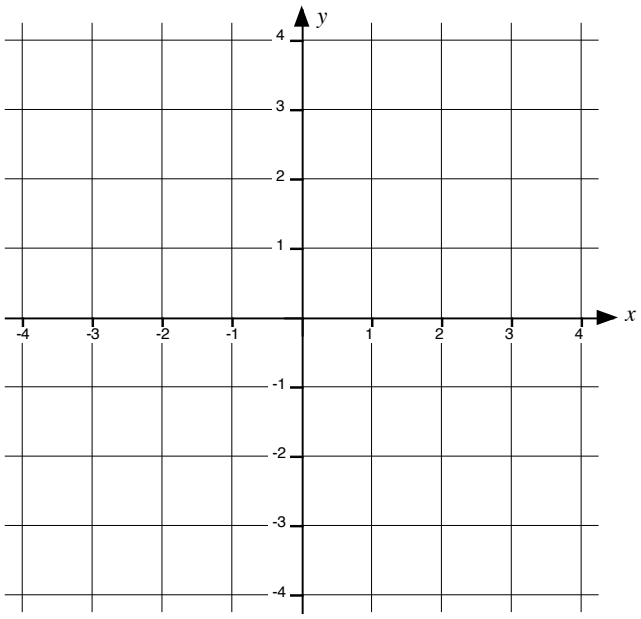
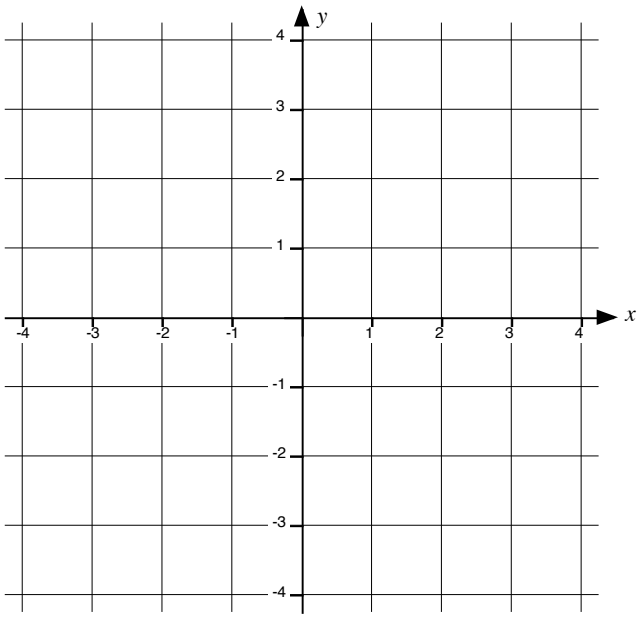
Quiz #3

1. **(2 points)** Use the axes provided below to sketch the region in the *xy*-plane consisting of points whose polar coordinates satisfy:

$$1 \le r \le 3 \text{ and } \frac{-\pi}{2} \le \theta \le \frac{\pi}{6}.$$

Two sets of axes are provided below in case you change your mind. Clearly indicate which one is your final answer – otherwise the grader will give you zero points.



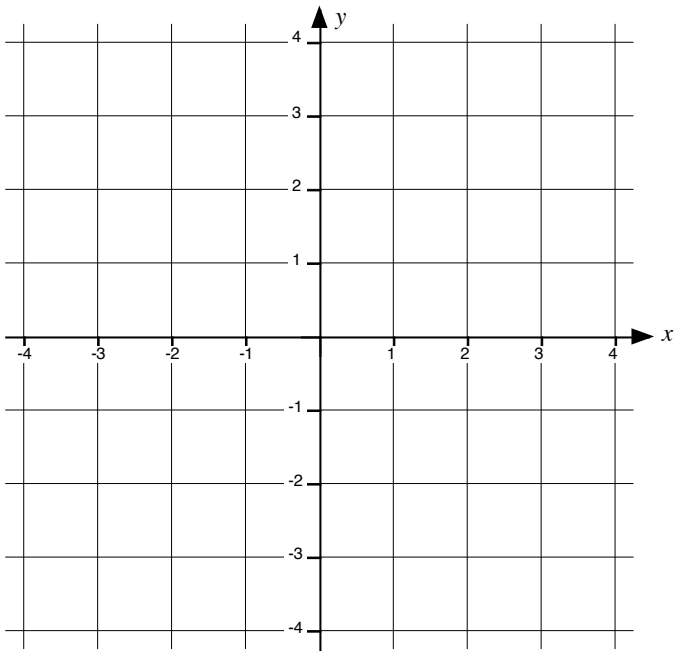


2. Consider the curve in the *xy*-plane defined by the polar equation:

$$r = \tan(\theta) \cdot \csc(\theta).$$

(a) **(2 points)** Find a Cartesian equation (i.e. one that involves only *x*, *y* and constants) for the curve. Show your work – no work = no credit.

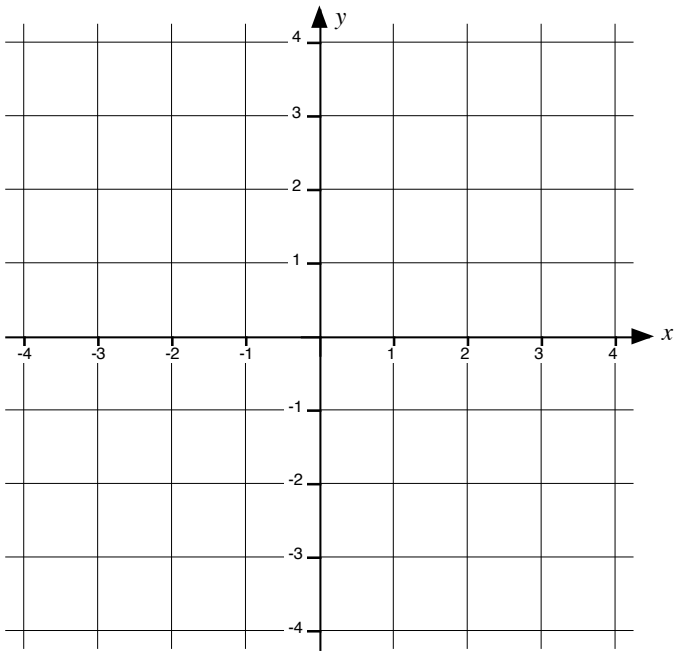
(b) **(1 point)** Use the axes provided below to sketch the curve defined by the polar equation $r = \tan(\theta) \cdot \csc(\theta)$ in the *xy*-plane.



3. Consider the curve in the *xy*-plane enclosed by the polar equation:

$$r = 2 + \sin(\theta).$$

(a) **(1 point)** Use the axes given below to sketch the area enclosed by the polar equation.



(b) **(2 points)** Set up an integral that will give the area enclosed by the polar equation.

(c) **(2 points)** Evaluate your integral from Part (b). It may be helpful to know that $\sin^2(x) = \frac{1}{2} \cdot (1 - \cos(2x))$.

You should not use your calculator on this problem for anything except simple arithmetic. If you need to find any antiderivatives, you should show your work. Finding antiderivatives on a calculator is not acceptable.