**(Q10)**
*(a)*

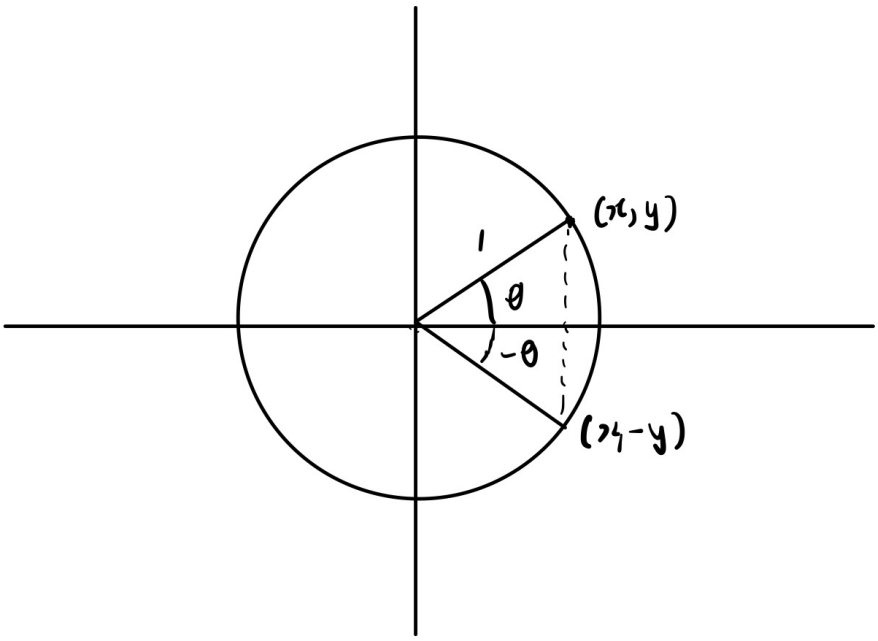
*Proof.* Let $C$ be the set of points on the unit circle, $x^2 + y^2 = 1$.
Using the above definition,

$$\forall (x, y) \in C, x^2 + y^2 = 1$$

By the definition of sin and cos,

$$\sin^2 \theta + \cos^2 \theta = 1$$

■




*(b)*

*Proof.* Considering the Cartesian plane, $\theta$ is the angle formed by the x-axis and a line from the origin to a point $(x, y)$, measured counterclockwise from the x-axis. Thus, $-\theta$ is the same angle, measured from the same point reflected on the x-axis.
Reflecting $(x, y)$ on the x-axis corresponds to the following transformation:

$$(x, y) \to (x, -y)$$

Since $\cos(\theta) = x$, $\cos(-\theta)$ is the x-coordinate of the point reflected on the x-axis, which is $x$. ■

*(c)*

*Proof.* Considering (b), a reflection of $\theta$ on the x-axis corresponds to the transformation of $(x, y) \to (x, -y)$. Since $sin(\theta) = y$, $sin(-\theta)$ is the y-coordinate of the point reflected on the x-axis, which is $-y$. ■