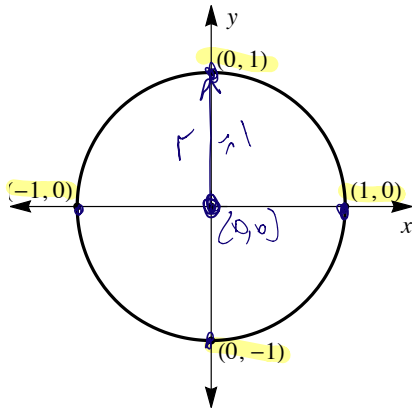
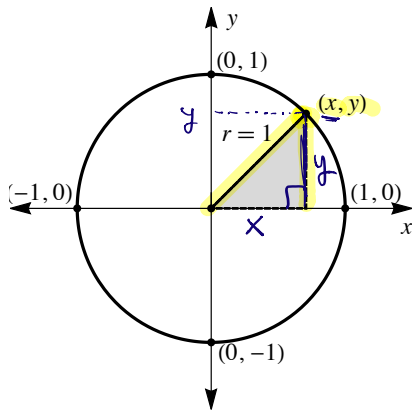


## Trigonometry 1: Equation of a Circle

Consider a circle with radius one unit and center point at the origin of the Cartesian Coordinate plane. Its plot is shown below. The points that are labeled are points on the circle.



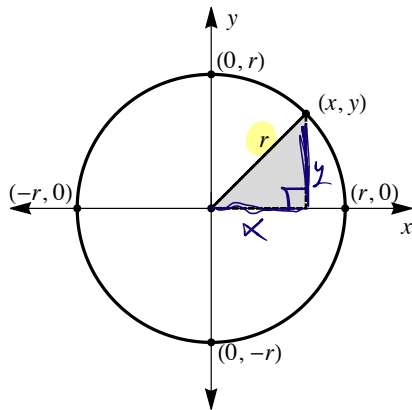
What are some other points on the circle? To answer that question, let's first derive the equation of our circle. Let's pick an arbitrary point on the circle (in the first quadrant) with coordinates  $(x, y)$ :



The right triangle that is formed has a base length of  $x$  and a height of  $y$ . From the Pythagorean Theorem, we know that the following must be true:

$$x^2 + y^2 = 1^2 \implies x^2 + y^2 = 1$$

The equation for a circle with radius of length 1, centered at the origin, has an equation:  $x^2 + y^2 = 1$ . If we recreate the plot with a circle of radius  $r$ , we get:



From the Pythagorean Theorem, we know that the following must also be true:

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

The equation for a circle with radius of length  $r$ , centered at the origin, has an equation:  $x^2 + y^2 = r^2$ .