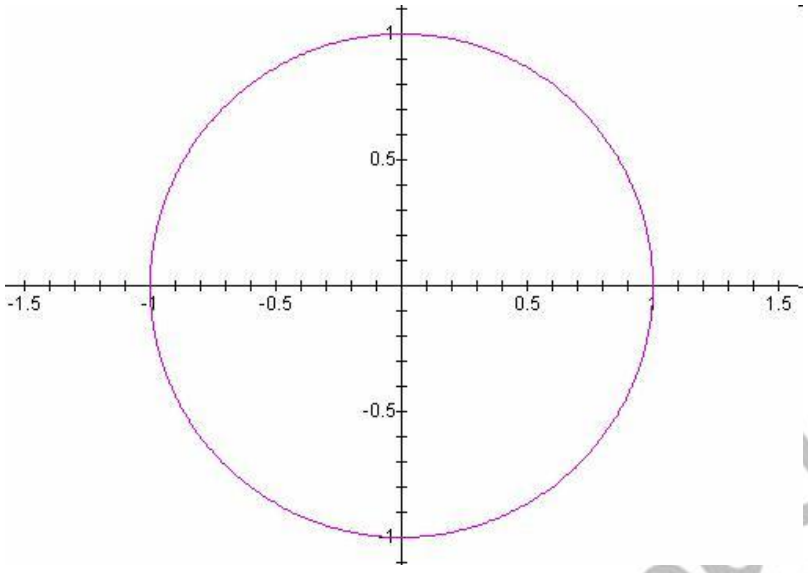
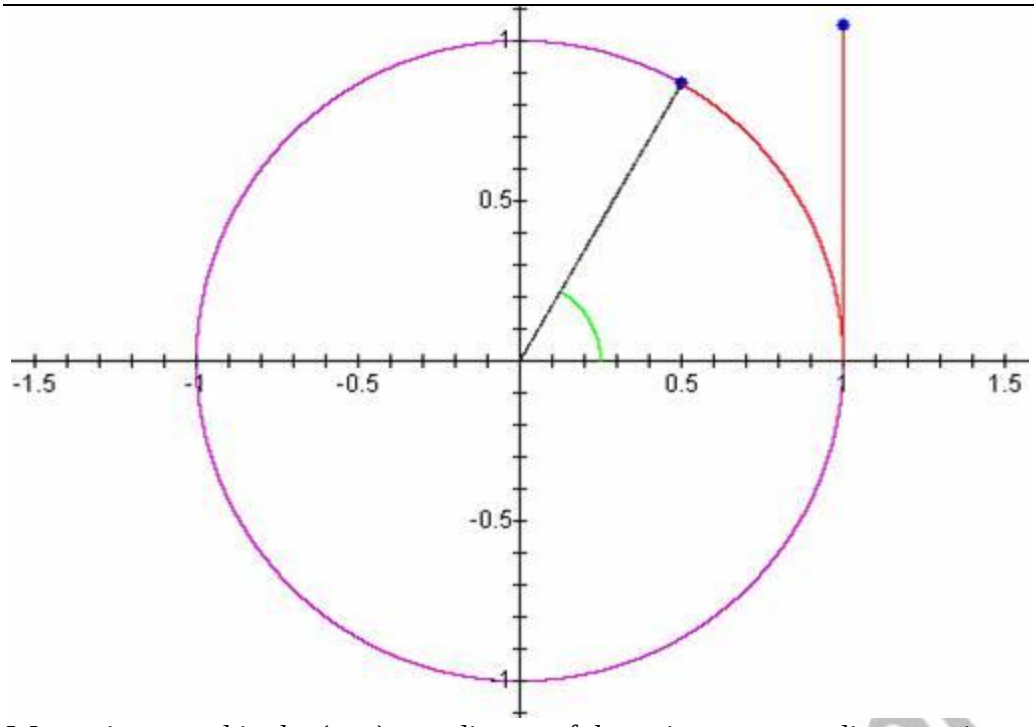
There are six basic trigonometric functions that we will use over and over throughout the course. There are two ways that we can define these functions, each having it's own advantages and disadvantages. The first way that we will look at the trig functions is as points on the unit circle.

Unit Circle Trigonometry:

First, we need to understand the unit circle. As the name implies, it is a circle where the radius is 1 (one unit). The unit circle equation is $x^2 + y^2 = 1$ and the graph looks like this:



Now, if we start at the point (1, 0) and walk a distance t around the circle, we will arrive at a point (x, y) represented by the blue point on the circle in the figure below. The distance traveled, t, is shown in red. At the right of the circle is a red line segment that ends in a blue point that is exactly the same length as the red arc ending in the blue point.



We are interested in the (x, y) coordinates of the point corresponding to going around the circle a distance of t.

There are six trigonometric functions: sine (abbreviated sin), cosine (abbreviated cos), tangent (abbreviated tan), cosecant (abbreviated csc), secant (abbreviated sec), and cotangent (abbreviated cot).

Here's how the trigonometric functions are defined. Let t be the distance traveled around the unit circle ending at the point (x, y):
sin(t) = y,
cos(t) = x,
tan(t) = y/x so long as x is not 0,
csc(t) = 1/y, so long as y is not 0,
sec(t) = 1/x so long as x is not 0,
cot(t) = x/y so long as y is not 0.
Note that csc is the reciprocal of sin, sec is the reciprocal of cos, and cot is the reciprocal of tan.