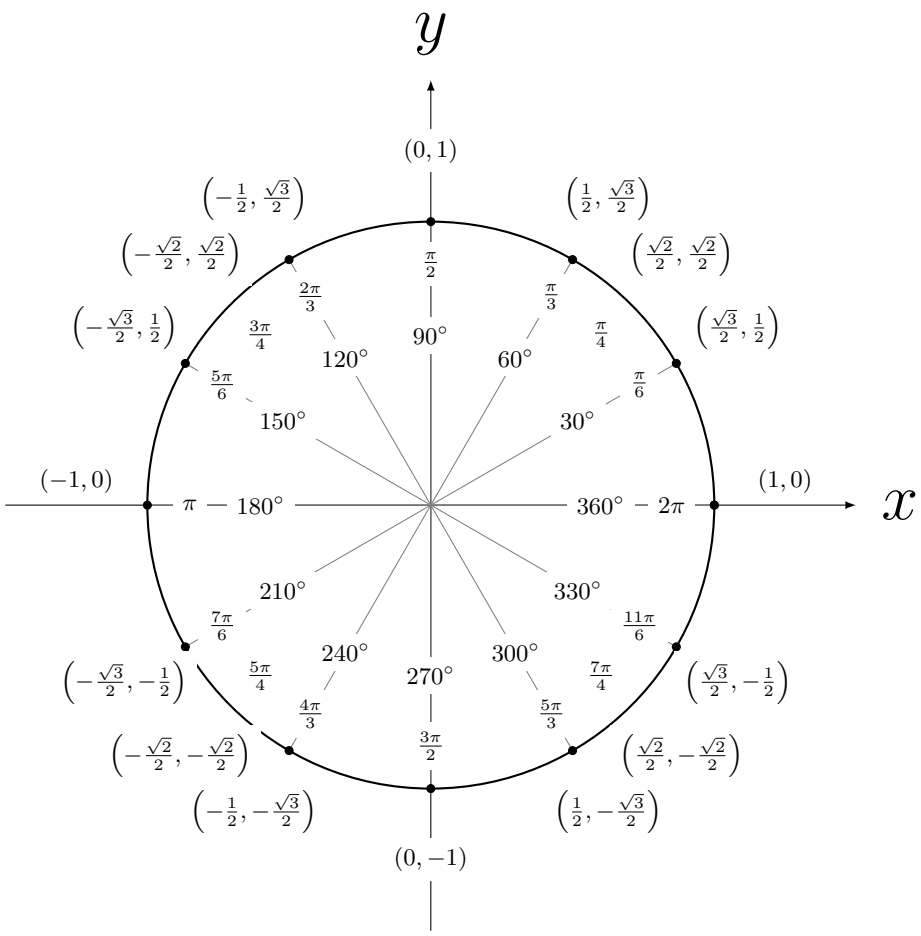
Trigonmetry

The Unit Circle:



– This is a circle of radius one. The prefix uni- means one. Thus, the unit circle has a radius equal to one.

– The equation for the unit circle is $x^2 + y^2 = 1$.

– The circumference of any circle is $2\pi r$, thus the cicumference of the unit circle is 2π.

– $\frac{1}{4}$ of the distance around the unit circle is $\frac{\pi}{2}$

– $\frac{1}{2}$ of the distance around the unit circle is π

– $\frac{3}{4}$ of the distance around the unit circle is $\frac{3\pi}{2}$

– the full distance around the unit circle is 2π

NOTE: Any point on the unit circle has a coordinate (x, y). If we draw a right triangle from the origin, $(0, 0)$, to the point on the unit circle, (x, y), to the point on the x-axis, $(x, 0)$, we can use the following formulas for sine, cosine, and tangent to show that for any point on the unit circle that:

$$\cos\theta = \frac{x}{r} = \frac{x}{1} = x$$

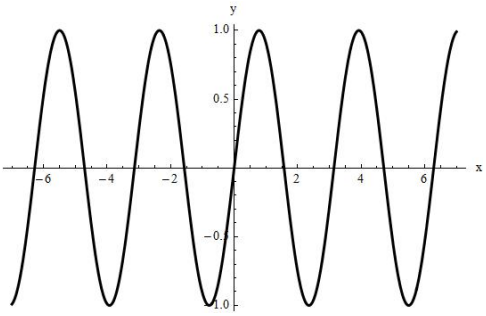
$$\sin\theta = \frac{y}{r} = \frac{y}{1} = y$$

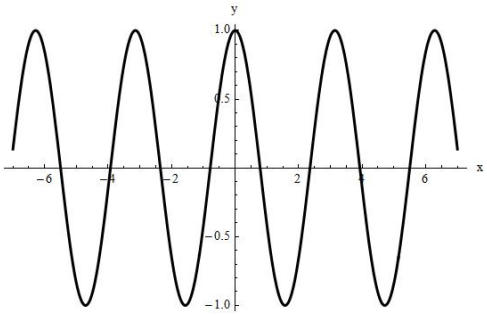
$$\tan\theta = \frac{y}{x}$$

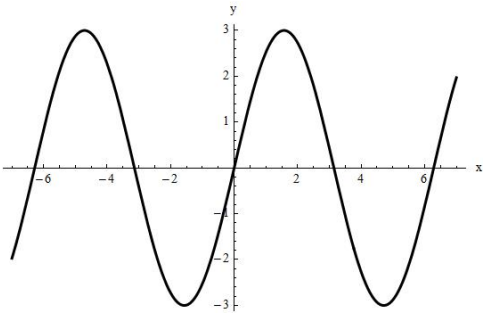
Match four of the following functions to the graphs below; then, graph the remaining two functions.

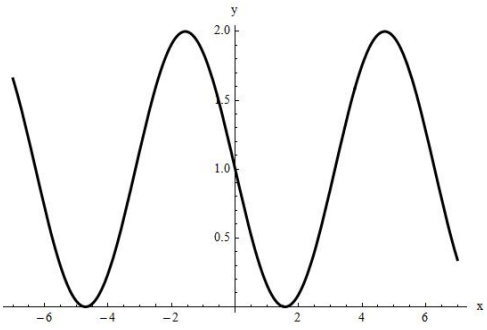
a. $f(x) = 1 + \sin x$ *b.* $g(x) = 1 - \sin x$ *c.* $h(x) = 3\sin x$

d. $r(x) = \cos 2x$ *e.* $s(x) = 3\sin(x)$ *f.* $m(x) = \sin 2x$









Radians and Degrees

Conversions:

$$\begin{array}{ll} 1 & radian\,(rad) = \left(\frac{180}{\pi}\right) \quad degrees\,(^\circ) \\ \pi & radians = 180 degrees \\ 1 & degree = \left(\frac{\pi}{180}\right) \quad degrees \end{array}$$

1. Find the radian measure of the angle when given the degree measure:

a.	36°	*b.*	200°	*c.*	45°
d.	-72°	*e.*	60°	*f.*	115°
g.	-135°	*h.*	150°	*i.*	-420°

2. Find the degree measure of the angle with the following radian measure:

a.	$\frac{3\pi}{4} rad$	*b.*	$-\frac{7\pi}{2} rad$	*c.*	$\frac{5\pi}{6} rad$
d.	$-\frac{\pi}{12} rad$	*e.*	$-1.5 rad$	*f.*	$\frac{2\pi}{9} rad$
g.	$\frac{\pi}{5} rad$	*h.*	$\frac{\pi}{18} rad$	*i.*	$\frac{5\pi}{3} rad$

Trigonometric Identities

Simplify the following trigonometric expressions:

1. $(\sin\theta)^2 + (\cos\theta)^2 - 1$

2. $(\sin\theta + \cos\theta)^2 + 2\cos\theta$

3. $(\sin\theta)(\cos\theta) + (\sin\theta)^3 - 2$

4. $2(\cos\theta)^2 + 2(\sin\theta)^2 + 1$