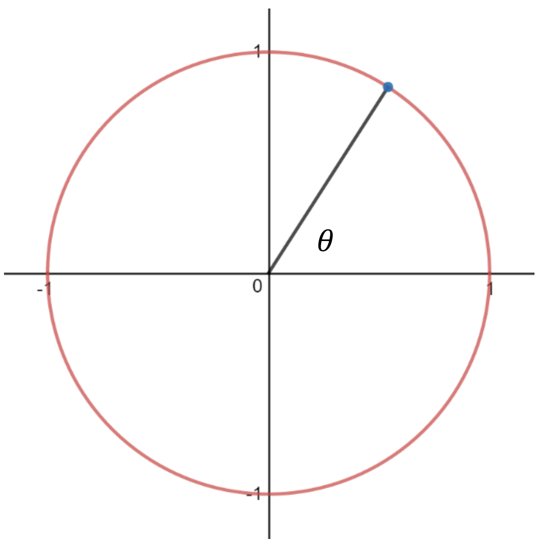
Trig Identities

Goal: • Can prove $\cos^2 x + \sin^2 x = 1$ using Pythagoras and can derive the other two identities from this one. • Understands that changing all trig terms to sine and cosine is the first step to simplifying identities. • Understands how the addition and subtraction identities are derived. Can use the identities to simplify trig statements.
New terminology: • Statement • Identity

Use the unit circle to show that $\sin\theta = y$ and $\cos\theta = x$.



The above statement is called an **identity** – something that is fundamentally true and can be used to support other statements. In mathematics, a **statement** is something that is true or false.

Example: Prove or provide a counterexample to the following statements. If true, then show it.

$$\sin x = x - \frac{x^3}{6}$$

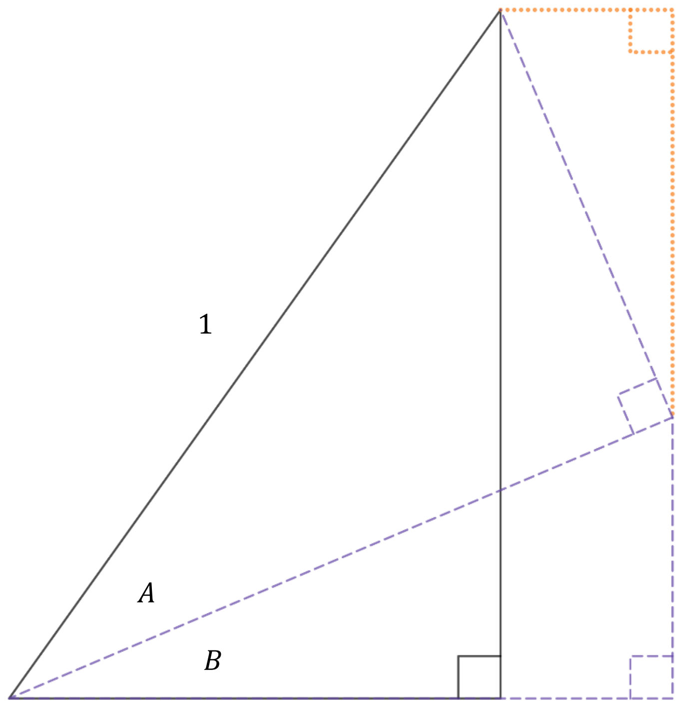
$$\sec x - \sec x \sin^2 x = \cos x$$

Practice: Prove or provide a counterexample to the following statement. If true, then show it.

$$\csc x - \sin x = \cot x$$

$$\tan^2 x \cdot \sin^2 x = \tan^2 x - \sin^2 x$$

Aside from the Pythagorean Identity, we will look at one other important identity: **Angle Addition Identity.**



We want to manipulate the above image so we know the following:

$\sin(A + B) =$

$\cos(A + B) =$

Example:
Determine the exact value of $\sin\left(\frac{\pi}{12}\right)$

Practice: Determine the exact value of $\cos\left(\frac{7\pi}{12}\right)$

Example: Simplify the following into a single sinusoidal equation

$r\cos A \cdot \sin x + r\sin A \cdot \cos x$

Example: Determine an equation for $2\sin x - \cos x$

Practice: Determine an equation for $-3\sin x + 4\cos x$

From the sum of angle identities, we get a set of important identities called **double angle identities**

$\sin 2A =$

$\cos 2A =$

$\cos^2 A =$

$\sin^2 A =$

Suggested Practice Problems: 6.1 # 3-6, 10-12, 14-16 6.2 # 1-8, 11, 14-16, 18-20, 23, 24	
Textbook Reading: page 290-295 and 299-305 Key Ideas page 296 and 305	
Next Class: Proving Trig Identities	