## **Trigonometric Identities**

## Math 141 - Workshop

The most important trig identity, by far, is  $\sin^2 \theta + \cos^2 \theta = 1$ . The second most important identities are the two **angle addition formulas**:

$$\sin(a+b) = \sin a \cos b + \cos a \sin b,$$

 $\cos(a+b) = \cos a \cos b - \sin a \sin b.$ 

1. Use the following image of triangles inside the unit circle to explain why the angle addition formula for sine is correct.



- (a) The two gray right triangles are similar (they have all the same interior angles, but are different sizes). Can you explain why?
- (b) How long are the hypotenuses of the two gray triangles?
- (c) Find the base and height for each of the two gray triangles.
- (d) Find coordinates of P, and use them to explain why the angle addition formulas are correct.