

Background

In class, we have derived several formulas for the sines and cosines of various angles, which we refer to as “trig identities”. These include the sum identities:

$$\sin(A + B) = \sin(A) \cos(B) + \cos(A) \sin(B)$$

$$\cos(A + B) = \cos(A) \cos(B) - \sin(A) \sin(B)$$

the Pythagorean identity:

$$\sin^2(\theta) + \cos^2(\theta) = 1$$

and the half angle identities:

$$\sin\left(\frac{\theta}{2}\right) = \sqrt{\frac{1 - \cos(\theta)}{2}}$$

$$\cos\left(\frac{\theta}{2}\right) = \sqrt{\frac{1 + \cos(\theta)}{2}}$$

We can use these formulas in various combinations to extend our knowledge of sines and cosines beyond what we started with on the unit circle.

Your Task

Answer the following questions:

1. Compute the sin and cos of each of the following angles (given in radians). You will need to apply one or more of the trig identities! Start from the given information that:

$$\sin(\theta) = \frac{3}{5}$$

Do NOT write your answers as calculator-generated decimal approximations - just leave square roots as they are. Your answers may contain square roots inside of square roots; don't worry about de-nesting them for now. (*Hint: You will likely want to start by finding $\cos(\theta)$*).

(a) $\frac{\theta}{2}$

(b) $\frac{\theta}{4}$

(c) $\frac{3\theta}{4}$

(d) Bonus: $\frac{\theta}{3}$

2. Compute $\tan\left(\frac{\pi}{24}\right)$.