

Purpose: In this problem set, we will solve trigonometric equations using the pythagorean identities, the negative angle identities, and the reciprocal identities.

1. Before we get started, we need to gather all of our trigonometric identities. **This should take no more than 5 minutes.** I would suggest splitting the work among your group-mates.

(a) There are *three* pythagorean identities. List them below.

(b) There are *six* negative angle identities. List them below.

(c) There are *four* reciprocal identities (i.e., the other trig functions expressed in sines and cosines). List them below.

2. *Goal:* Solve $5 + 7 \sin(x) - 2(\cos(x))^2 = 0$.

(a) Can you find somewhere to use a pythagorean identity? Write the identity you are using and our equation with the identity applied.

(b) I see a quadratic. Factor it! Solve for $\sin(x)$.

(c) Use our methods from yesterday to solve the remaining equations. Remember to give *all* solutions.

3. Solve $\sin(x) = 1 + \cos(x)$. There's a few ways to go here so we'll actually solve this one twice.

(a) First, collect the trig functions on one side and leave the constant on the other.

(b) Square both sides. (Be sure to avoid the most common mistake when squaring a binomial.)

(c) Find an identity to use to simplify things a bit.

(d) Isolate the trig functions again.

(e) Solve! (You have a produce of things equal to zero—how can we solve this?)

4. Solve $\sin(x) = 1 + \cos(x)$. (Take 2)

(a) Square both sides.

(b) Use a pythagorean identity to replace $(\sin(x))^2$.

(c) Simplify and collect all of the trig functions on one side.

(d) Factor.

(e) Solve!

5. Solve $\tan(x) = 3 \sin(x)$. *Hint: use the reciprocal identity for tangent.*

6. $\sec(\sin(x)) - 2 \sin(x) = 0$