Math 128
6.1 Assignment

Read pages 475-476. Reading over some of the examples in the section may prove extremely helpful. We will be working on verifying trigonometric identities, equations that are true for all angles θ (or whatever variable they use).

General Tips:
** Your general algebra skills and neatness are going to be important. As my old algebra teacher used to say, “Mind your p’s and q’s”. Remember also the old algebraic properties: the distribution and commutative properties for instance.

** Start with the more complicated side of the equation; try to reduce it to look like the other side. Before you begin, look at this other side and see what types of objects (cosines, sines, etc) are needed; try to use identities that have these objects.

** Prepare a sheet of paper with all the identities on it for reference. Add to it as you learn new ones.

** Consider variations of identities. For example, $\sin^2\theta + \cos^2\theta = 1$ can be thought of as $\cos^2\theta = 1 - \sin^2\theta$ or $\cos\theta = \pm\sqrt{1-\sin^2\theta}$.

** Try turning $\tan\theta$ into $\sin\theta / \cos\theta$ and $\cot\theta$ into $\cos\theta / \sin\theta$.

** Combine sums and differences of fractions into single fractions.

** Sometimes rewriting one side in terms of only sines and cosines will help.

** Remember $\cos\theta$ and such things are one entity, like f(x). You are not multiplying cos and θ . Also remember $\sin^2\theta$ means $(\sin\theta)^2$.

** Don’t get frustrated. If one thing does not work, erase and start on a different path.

Let's do #25, page 479.

$$\frac{1+\tan q}{1-\tan q}=\frac{\cot q+1}{\cot q-1}$$

Since the right is more complicated having the cotangents instead of tangents, let's start on the right. Also notice we want tangents on the left. Remembering that cot q = 1/ tan$q$ may help out. Use this fact to change the right side below.

$$\frac{\cot q+1}{\cot q-1}=$$

(Did you get $\frac{\cot q+1}{\cot q-1}=\frac{\frac{1}{\tan q}+1}{\frac{1}{\tan q}-1}$? Good.)

We are getting closer. Notice now we have tangents like what we are trying to get to. But these fractions on top and bottom are cumbersome, so let's try to simplify. Maybe something will fall out. Get like denominators of tan$q$ and then perform the addition/subtraction.

(Did you get $\frac{\frac{1}{\tan q}+1}{\frac{1}{\tan q}-1}=\frac{\frac{1+\tan q}{\tan q}}{\frac{1-\tan q}{\tan q}}$? Good.)

Notice we are now dividing two fractions. Flip and multiply to see what we get. You should end up with the left side of the identity. Put some mark like a check mark to indicate you're done with the proof.

Let’s try a few more. I’ll only give you minor hints.

#21 on page 479

$3\sin^2 q + 4\cos^2 q = 3 + \cos^2 q$

Start with the left side because it’s more complicated. Notice there are $\sin^2 q$ and $\cos^2 q$ terms so I would consider the identity $\sin^2 q + \cos^2 q = 1$. Also think about $3\sin^2 q + 4\cos^2 q$ as $3\sin^2 q + 3\cos^2 q + \cos^2 q$.

#52 page 480

$$\frac{\sin^2 q - \tan q}{\cos^2 q - \cot q} = \tan^2 q$$

Remember $\tan q$ is ${\sin q}/{\cos q}$ and $\cot q$ is ${\cos q}/{\sin q}$. Then just start simplifying. Remember the distribution property (or the reverse, factoring).

#51 on page 480

$$\frac{\sec q - \csc q}{\sec q * \csc q} = \sin q - \cos q$$

The more complicated side is the left side so we'll start there. Remember sec q is 1/cos$q$ and csc q is 1/sin$q$. From there, combine fractions and simplify.

Try some more: 6.1: 1, 9, 27, 33, 37, 49, 73