Problems PreCal 1508 PLTL Workshop, November 16, 2011
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Please do the problems that you feel will help your group the most first (you don't have to do them in order). All handouts are available at `http://alex.knaust.info/pltlfall2011/`

1. Timothy presents the following proof for the identity $\sec y \cos y = 1$

$$\sec y \cos y = 1 \qquad \text{Original problem}$$

$$\iff \sec y = \frac{1}{\cos y} \qquad \text{Divide both sides by } \cos y$$

   Since this last statement is a known identity, he concludes that $\sec y \cos y = 1$.

   (a) His Teacher gives him 0 pts for the proof and says it is wrong. Where did little Timmy go wrong?

   (b) Use this technique to 'prove' something that you know not to be true (i.e. $1 = 2$)

2. Use the Pythagorean theorem to derive the identity $\sin^2 x + \cos^2 x = 1$

3. Prove (Verify) the following identities. **Please be very clear about how you get from one step to the next.**

   (a) $\tan t \cot t = 1$

   (b) $\frac{\tan^2 \theta}{\sec \theta} = \sin \theta \tan \theta$

   (c) $\frac{\cot x}{\sec x} = \csc x - \sin x$

   (d) $\frac{\csc(-x)}{\sec(-x)} = -\cot x$

   (e) $\frac{1+\sin\theta}{\cos\theta} + \frac{\cos\theta}{1+\sin\theta} = 2\sec\theta$

   (f) $\frac{1}{\cos x+1} + \frac{1}{\cos x-1} = -2\csc x \cot x$

   (g) $\sin^2\alpha - \sin^4\alpha = \cos^2\alpha - \cos^4\alpha$

4. Use $\sin^2 x + \cos^2 x = 1$ to show $1 + \tan^2 x = \sec^2 x$ and $1 + \cot^2 x = \csc^2 x$

5. Use other identities on your identity chart to show the following identities

   (a) $\frac{\tan x + \cot y}{\tan x \cot y} = \tan y + \cot x$

   (b) $\sec^2\left(\frac{\pi}{2} - x\right) - 1 = \cot^2 x$