SLU PreCalculus Quiz 6 Spring 2007

Name ______________________________ Score_____________/10

Please Print Clearly

1. Prove the identity $\cos^4\beta - \sin^4\beta = \cos(2\beta)$

Proof:

$\cos^4\beta - \sin^4\beta = (\cos^2\beta - \sin^2\beta)(\cos^2\beta + \sin^2\beta) = (\cos^2\beta - \sin^2\beta)(1) = \cos(2\beta)$

2. Use the identity $\cos(x - y) = \cos(x)\cos(y) + \sin(x)\sin(y)$ to prove the identity $\cos(180° - \beta) = -\cos(\beta)$

Proof:

$\cos(180° - \beta) = \cos(180)\cos(\beta) + \sin(180)\sin(\beta) = (-1)\cos(\beta) + (0)\sin(\beta) = -\cos(\beta)$

3. Prove the identity $\cos(\alpha + 60°) + \sin(30° + \alpha) = \cos(\alpha)$

Proof:

$\cos(\alpha + 60°) + \sin(30° + \alpha) = \cos(\alpha)\cos(60) - \sin(\alpha)\sin(60) + \cos(30)\sin(\alpha) + \cos(\alpha)\sin(30)$

$$= \cos(\alpha)\left(\frac{1}{2}\right) - \sin(\alpha)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{3}}{2}\right)\sin(\alpha) + \cos(\alpha)\left(\frac{1}{2}\right)$$

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

4. Provide a counterexample to show that $\sin(x) + 2\cos(x) = 0$ is not an identity.

Let $x = \frac{\pi}{2}$, then $\sin(x) + 2\sin(x) = \sin(\frac{\pi}{2}) + 2\sin(\frac{\pi}{2}) = 1 + 2 \neq 0$

$\frac{\pi}{2}$ is a counterexample to the statement and therefore the statement is not an identity.