Math 1151, Lecture 010, Evaluative Exercise 2
February 18, 2010

Name: ______________________________

Discussion Section: __________

Discussion TA: ______________________________

Seating Section: Left Front / Right Front / Left Back / Right Back

You have twenty-five minutes to complete the following five problems, without using your notes, your book, or a calculator.

Sum and Difference Formulas

$$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$$

$$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

$$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$

Double-angle Formulas

$$\sin(2\theta) = 2\sin\theta\cos\theta$$

$$\cos(2\theta) = \cos^2\theta - \sin^2\theta$$

$$\cos(2\theta) = 2\cos^2\theta - 1$$

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

Half-angle Formulas

$$\sin^2\frac{\alpha}{2} = \frac{1-\cos\alpha}{2}$$

$$\cos^2\frac{\alpha}{2} = \frac{1+\cos\alpha}{2}$$

1. Solve for x:

$$\tfrac{\pi}{2} = \tfrac{2}{3}\sin^{-1}x + \tfrac{\pi}{3}$$

2. Establish the identity:

$$1 - \frac{\sin^2\theta}{1-\cos\theta} = -\cos\theta$$

3. If $\cos\alpha = \frac{1}{4}$, $0 < \alpha < \frac{\pi}{2}$ and $\sin\beta = -\frac{3}{5}$, $-\frac{\pi}{2} < \beta < 0$, find the exact value of

(a) $\sin(\alpha + \beta)$

(b) $\cos(2\alpha)$

(c) $\sin\left(\frac{\beta}{2}\right)$

4. Develop a formula for $\cos 3\theta$ as a third degree polynomial in the variable $\cos\theta$. (That means your answer should be in terms of powers of $\cos\theta$, without any $\sin\theta$, $\sin n\theta$, or $\cos n\theta$.)

5. (**Challenge**) Write an equivalent expression for $\cos^4\theta$ that does not involve any powers of sine or cosine greater than 1.