MAT119 Test 3 (Fall 2012): More trig

Name:

Directions: All problems are equally weighted. Show your work! Answers without justification will likely result in few points. Your written work also allows me the option of giving you partial credit in the event of an incorrect final answer (but good reasoning). Indicate clearly your answer to each problem (e.g., put a box around it). **Good luck!**

Problem 1. Sketch the graph of $1-2\sin\left(2(x+\frac{\pi}{2})\right)$ by transforming the graph of $\sin(x)$. Describe the transformations used, and give the amplitude and period of the resulting wave.

Problem 2. Given the Pythagorean Identity

$$\sin^2(x) + \cos^2(x) = 1$$

the addition formulas

$$\sin(s+t) = \sin(s)\cos(t) + \sin(t)\cos(s) \quad \text{and} \quad \cos(s+t) = \cos(s)\cos(t) - \sin(t)\sin(s)$$

the half-angle formula

$$\sin\left(\frac{x}{2}\right) = \pm\sqrt{\frac{1-\cos x}{2}}$$

and these exact reference angles:

reference angle	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$
	0°	30°	45°	60°	90°	180°	270°
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	–	0	–

Find **exact** values of the following:

a. $\sin\left(\frac{\pi}{8}\right)$

b. $\cos\left(\frac{5\pi}{8}\right)$

c. $\sin\left(\frac{7\pi}{12}\right)$

Problem 3. Simplification and identities

a. Simplify this expression: $\sin(\theta) + \cos(-\theta)\tan(-\theta)$

b. Demonstrate that $\sin^4(x) - \cos^4(x) = \sin^2(x) - \cos^2(x)$.

c. Demonstrate that $\sin\left(x - \frac{\pi}{2}\right) = -\cos(x)$.

Problem 4. Find $\sin(2x), \cos(2x)$, and $\tan(2x)$ from the given information:

$$\sin(x) = .92 \text{ and } \frac{\pi}{2} < x < \pi$$

Problem 5. Find all solutions to the following equations:

a. $3\sin^2(x) = 1$

b. $\tan(\theta) = -\sqrt{3}$

Problem 6. Solve the equation $1 + \cos(\theta) = 2\sin^2(\theta)$. Make sure to give all solutions.