MATH 125
SPRING 2014 NAME:
EXAM 4

1. [5 pts. each] Carry out the conversion, showing work.
   (a) Convert $-340°$ to radian measure, leaving answer in terms of π.
   (b) Convert 8π to degree measure.

2. [10 pts.] Determine the amplitude, period, and phase shift of the function
$$y = -\frac{1}{2}\sin\Big(3x - \frac{\pi}{2}\Big).$$

3. [10 pts.] Simplify
$$\frac{\tan^2\theta}{\sec\theta} \div \frac{3\tan^3\theta}{\sec\theta}.$$

4. [10 pts.] Use a sum-and-difference identity to find the exact value of $\tan 105°$.

5. [10 pts. each] Establish the identity.
   (a) $\dfrac{1+\cos^2 x}{\sin^2 x} = 2\csc^2 x - 1$
   (b) $\dfrac{1+\sin x}{1-\sin x} = (\sec x + \tan x)^2$

6. [10 pts. each] Find the exact value.
   (a) $\sin^{-1}\big(\cos\frac{\pi}{6}\big)$
   (b) $\tan\big(\sin^{-1}\frac{1}{10}\big)$

7. [10 pts. each] Find all solutions in $[0, 2\pi)$ exactly.
   (a) $2\cos x + 2\sin x = \sqrt{6}$
   (b) $2\sec x\tan x + 2\sec x + \tan x + 1 = 0$

8. [10 pts. each] Solve the triangle, rounding to the tenths place.
   (a) $C = 46°32'$, $a = 56.2$ m, $c = 22.1$ m.
   (b) $A = 10°$, $a = 3$, $b = 10$.
   (c) $a = 4$, $b = 3$, $c = 6$.

TRIGONOMETRIC IDENTITIES

$$\sin(u \pm v) = \sin u \cos v \pm \cos u \sin v$$

$$\cos(u \pm v) = \cos u \cos v \mp \sin u \sin v$$

$$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \tan v}$$

$$\sin 2x = 2 \sin x \cos x$$

$$\cos 2x = \cos^2 x - \sin^2 x$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

$$\sin \frac{x}{2} = \pm \sqrt{\frac{1 - \cos x}{2}}$$

$$\cos \frac{x}{2} = \pm \sqrt{\frac{1 + \cos x}{2}}$$

$$\tan \frac{x}{2} = \frac{\sin x}{1 + \cos x}$$

$$\sin x \sin y = \tfrac{1}{2}[\cos(x - y) - \cos(x + y)]$$

$$\cos x \cos y = \tfrac{1}{2}[\cos(x - y) + \cos(x + y)]$$

$$\sin x \cos y = \tfrac{1}{2}[\sin(x - y) + \sin(x + y)]$$

$$\cos x \sin y = \tfrac{1}{2}[\sin(x + y) - \sin(x - y)]$$

$$\sin x + \sin y = 2 \sin \frac{x + y}{2} \cos \frac{x - y}{2}$$

$$\sin x - \sin y = 2 \cos \frac{x + y}{2} \sin \frac{x - y}{2}$$

$$\cos y + \cos x = 2 \cos \frac{x + y}{2} \cos \frac{x - y}{2}$$

$$\cos y - \cos x = 2 \sin \frac{x + y}{2} \sin \frac{x - y}{2}$$