Math 113 Take Home 2 Name: _____

Due on Thursday June 25, 2015

Code of Academic Honesty

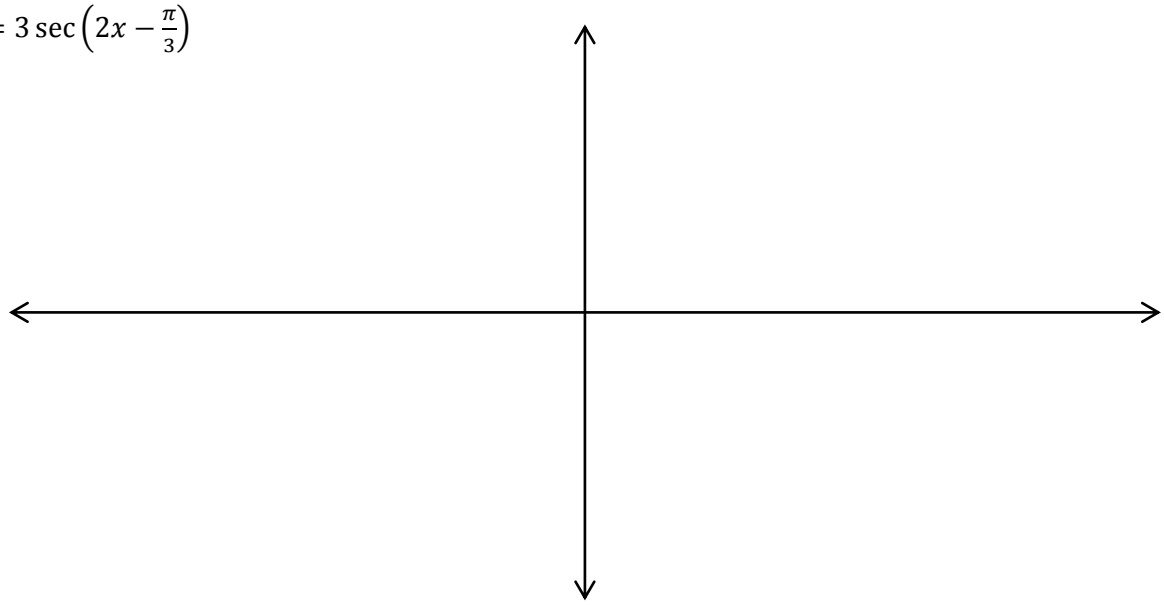
The work on this exam represents my own. I am allowed to use class notes and lectures. I am not allowed to get help from any other human being (classmates, other teachers, tutors, spouses, children, other family members,….).

Signature_____ Date: _____

GRADE: _____%

1. Perform the multiplication and use the fundamental identities to simplify $(3 - 3\cos x)(3 + 3\cos x)$. (6 points)

2. Sketch two cycles of the graph of the following function. Label all your asymptotes and points clearly. (8 points)
   $y = 3\sec\left(2x - \frac{\pi}{3}\right)$



3. Use the trigonometric substitution to write the algebraic expression as a trigonometric function of θ, where $\frac{\pi}{2} < \theta < \pi$. Simplify your answer. (10 points)
   $\sqrt{64 - 16x^2}$, $x = 2\sin\theta$

4. Find the exact value of $\cos(\alpha + \beta)$ using the fact that $\sin\alpha = \frac{3}{5}$, $0 < \alpha < \frac{\pi}{2}$; $\cos\beta = \frac{\sqrt{5}}{5}$, $-\frac{\pi}{2} < \beta < 0$. (8 points)

5. Find the values of all the missing parts of a triangle ABC. Use Law of Sines and Cosines as needed. (12 points)
   a. $a = 12\,m,\ b = 16\,m,\ c = 25\,m$

b. $a = 9.72\ km,\ \ b = 11.8\ km,\ \ A = 38°40'$

6. Verify the following identities. (20 points)

a) $\sin(3\theta) = 3\sin\theta - 4\sin^3\theta$

b) $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \frac{1+\sin\theta}{|\cos\theta|}$

c) $\cos\theta = \frac{1-\tan^2(\theta/2)}{1+\tan^2(\theta/2)}$

d) $\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1} = \tan\theta + \sec\theta$

7. Use the cofunction identities to evaluate the expression $\cos^2 20° + \cos^2 52° + \cos^2 38° + \cos^2 70°$ without the aid of a calculator. (6 points)

8. Find the exact value of the following expressions without using a calculator. (20 points)

a. $\cos 15° \cos 60° + \sin 15° \sin 60°$

b. $\dfrac{\tan(5\pi/4) - \tan(\pi/12)}{1 + \tan(5\pi/4)\tan(\pi/12)}$

c. $\sin 15°$

d. $\cos(\arcsin(\pi/6))$

9. Find all complex cube roots of -125. (Hint: use $z^{1/n} = r^{1/n}\left(\cos\left(\frac{\theta+2\pi k}{n}\right) + i\sin\left(\frac{\theta+2\pi k}{n}\right)\right)$.) (5 points)

10. Find the exact value of $(2+2i)^4$. (Hint: $(r\ cis\theta)^n = r^n cis(n\theta)$) (5 points)