MA 115 Exam 4(A) Name:

1. State the Law of Sines and Cosines:

   (a) (b)

2. Find the Exact Value (By hand)(Not showing work is worth 0 pts)

   a) $\sin(\frac{7\pi}{12})$

   b) $\cos(\frac{7\pi}{12})$

   $\tan(\frac{5\pi}{12})$

3. Find All Solutions to the Following:

a) $2\cos(4x) - \sqrt{3} = 0$

b) $\Big(1 + \tan(x)\Big)\sin(x) = 0$

c) $\cos(x)\sin(x) + \cos(x) = 0$

4. Verify the following identities:

a. $\dfrac{1+\cos(x)}{\sin(x)} + \dfrac{\sin(x)}{1+\cos(x)} = 2\csc(x)$

b. $\dfrac{\cos^2(x) - \cos(2x)}{\sin^2(x)} = 1$

4. Solve for any possible triangles. If not possible, indicate so:

a) $a = 5$, $b = 7$, $c = 9$

b) $A = 135, a = 5, b = 9$

c) $A = 15°, a = 18, b = 32$

5. Word Problems

a) An incredibly intelligent and hungry pelican measures the angle of depression to two fish in the water in front of the themselves as 25 degrees and 40 degrees respectively. If the bird is flying at an altitude of 10,000 feet, help them find the distance between the two fish, so they can decide if they should try to eat both. Draw a picture.

b) Sir Arthur does not have enough time to cross the lake to fight the Dragon, so he must shoot it down with one well placed arrow.

To find the distance between himself and the Dragon, he sends his Scout who locates point S on land such that angle ASD is 55 degrees, the distance from Arthur to the Dragon is 279 feet, and the distance from the Scout to Dragon is 321 feet. Find the distance between the Dragon and Arthur. Draw a picture. (No need for a detailed dragon and knight...)

BONUS: Give me an example of a bonus question you think would be really fun to have on an exam.

Formula Sheet

$$\sin(A+B) = \sin(A)\cos(B) + \sin(B)\cos(A)$$

$$\sin(A-B) = \sin(A)\cos(B) - \sin(B)\cos(A)$$

$$\cos(A+B) = \cos(A)\cos(B) - \sin(A)\sin(B)$$

$$\cos(A-B) = \cos(A)\cos(B) + \sin(A)\sin(B)$$

And as an application of these formulas...

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

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

And remember:

$$\tan(x) = \frac{\sin(x)}{\cos(x)}$$