

Math 1160K - Exam 3

Name: _____

Monday, November 10, 2014

Time: 50 minutes

Instructor: Brittany Cuchta

Instructions:

- Do not open the exam until I say you may.
- All cell phones and other electronic noisemaking devices must be turned off or completely silenced (i.e., not on vibrate) for the duration of the exam.
- The exam *must* be taken in pencil. Using a pen on the exam will result in the loss of points.
- Failure to follow directions specific to a problem will result in the loss of points.
- Circle or box your final answer where appropriate. Put your final answer in the provided space when available. Failure to do so will result in points being deducted.
- Show **all** work. Full credit will only be given if work is shown which **fully and clearly** justifies your answer. I reserve the right to not grade a problem which I cannot read.
- Answers must be exact (like $\sqrt{2}$), not approximate (like 1.414), unless a problem specifically indicates otherwise.
- All final answers must be simplified unless otherwise specified. **Rationalization is not required unless otherwise specified.**
- If you run out of room, use the back of the page and indicate this on the question.
- As always, you are expected to exhibit academic integrity during the exam.

Page:	1	2	3	4	5	Total
Points:	25	21	21	22	11	100
Score:						

$$\sin \alpha \sin \beta = \frac{1}{2} [\cos (\alpha - \beta) - \cos (\alpha + \beta)]$$

$$\cos \alpha \cos \beta = \frac{1}{2} [\cos (\alpha - \beta) + \cos (\alpha + \beta)]$$

$$\sin \alpha \cos \beta = \frac{1}{2} [\sin (\alpha + \beta) + \sin (\alpha - \beta)]$$

$$\sin \alpha + \sin \beta = 2 \sin \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$$

$$\sin \alpha - \sin \beta = 2 \sin \frac{\alpha - \beta}{2} \cos \frac{\alpha + \beta}{2}$$

$$\cos \alpha + \cos \beta = 2 \cos \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$$

$$\cos \alpha - \cos \beta = -2 \sin \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2}$$

1. Find the exact value of the following expressions.

(a) (7 points) $\sin\left(2\cos^{-1}\frac{1}{3}\right)$

Solution: _____

(b) (9 points) $\cos\left[\sin^{-1}\frac{4}{5} + \tan^{-1}(-1)\right]$

Solution: _____

(c) (9 points) $\sin\left[\sin^{-1}\frac{1}{2} - \cos^{-1}\left(-\frac{2}{3}\right)\right]$

Solution: _____

2. Solve the following equations on the interval $[0, 2\pi)$.

(a) (8 points) $\cos(2\alpha) + 6\sin^2\alpha = 3$

Solution: _____

(b) (8 points) $\sin\theta - \sin(2\theta) = 0$

Solution: _____

3. (5 points) Write the following as a sum and/or difference of sines and cosines.

$$\cos 3\theta \cos 4\theta$$

4. Find the exact value of the following expressions. Failure to show sufficient work will result in no points being awarded.

(a) (8 points) If $\tan \theta = -2$, $\cos \theta < 0$, find $\cos \frac{\theta}{2}$.

Solution: _____

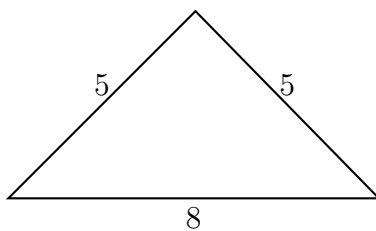
(b) (5 points) $\sin \left(\frac{5\pi}{8} \right)$

Solution: _____

5. (8 points) Prove (establish) the following identity.

$$\sec(2\theta) = \frac{\sec^2 \theta}{2 - \sec^2 \theta}$$

6. (11 points) Solve and find the area of the following triangle. Round all answers to two decimal places.



$A =$ _____ $B =$ _____ $C =$ _____ Area = _____

7. (11 points) Solve the triangle with the given information. There may be one, two, or no solution. Be sure to give reasoning supporting your argument for the number of triangles. Round all answers to two decimals.
 $b = 4$, $c = 3$, $B = 40^\circ$

Number of Triangles: _____ $A =$ _____ $C =$ _____ $a =$ _____
 $A' =$ _____ $C' =$ _____ $a' =$ _____

8. (11 points) Rhanda, the navigator of a ship at sea, spots two lighthouses that she knows to be 2 miles apart along a straight shoreline. She determines that the angles formed between the two line-of-sight observations of the lighthouses and the line from the ship directly to shore are 12° and 30° (refer to the figure). How far is the ship from shore? Round your answer to two decimal places.

