MATH 117 EXAM 3

Fall 2011

THIS EXAM IS PROVIDED AS A SAMPLE OF A PREVIOUSLY ADMINISTERED EXAM.

IF YOU ARE USING THIS EXAM AS PART OF A COURSE REVIEW, PLEASE NOTE *YOUR* EXAM MAY COVER DIFFERENT MATERIAL AND EMPHASIZE DIFFERENT PROBLEMS. USE THIS EXAM ONLY AS PART OF YOUR STUDY/REVIEW ROUTINE – MAKE SURE TO REVIEW YOUR CLASS ACTIVITIES (QUIZZES, TEXTBOOK ASSIGNMENTS, ETC.) !

Instructions: Make sure all electronic devices are turned off and stowed. This includes cell phones, ipods, or ipads. Only a scientific calculator is allowed.

NO GRAPHING CALCULATORS!!

On the scan sheet

1. **WRITE and CODE: Your name, last name first.**
2. **WRITE and CODE course and section number: Course no.: 117 See chart for appropriate section number.**
3. **Do not fill in the student ID number.**
4. **Put your instructor's name at INSTRUCTOR.**
5. **Put the test form (located at lower right corner) at TEST FORM**

After the exam begins:

1. **Fill out the information at TOP of page 7.**
2. **Check to be sure you have 8 pages and 17 problems.**

When finished submit the scan sheet and pages 7 and 8.

TEST FORM: 3-A1

Please choose the correct response and code it on the scan sheet for each of the 14 multiple-choice questions. Each multiple-choice question is worth 10 points. To receive proper credit, make sure erasures are complete on the scan sheet.

1. Suppose $P(x,y)$ is a point on the unit circle corresponding to the distance t. If point P lies in Quadrant IV and the x-coordinate of P is $\frac{1}{3}$, determine $\sin t$.

a. $\frac{-\sqrt{10}}{3}$ ***b.*** $\frac{2\sqrt{2}}{3}$

c. $\frac{-2\sqrt{2}}{3}$ ***d.*** $\frac{2}{3}$

e. **None of the preceding**

2. Determine the solution to the system of equations: $\begin{cases} 3x+4y=-12 \\ x-2y=-4 \end{cases}$. Which of the following is true?

a. **The solution is a point on the x-axis.**
b. **The solution is a point in Quadrant II.**
c. **The solution is a point on the y-axis.**
d. **The solution is a point in Quadrant III.**
e. **There is no solution.**

3. Two points A and B are 200 feet on the same side of a river. A reference point C is on the opposite side of the river and $\angle BAC = 78.1°$ and $\angle ABC = 58.3°$. Approximate to the nearest tenth, the distance from point B to C.

a. **141.0 feet** ***b.*** **230.0 feet**

c. **283.8 feet** ***d.*** **173.9 feet**

e. **None of the preceeding**

4. Which of the following is equivalent to $\sin\left(\frac{7\pi}{6}+a\right)$? (Use an addition identity.)

a. $\frac{1}{2}\cos a+\frac{\sqrt{3}}{2}\sin a$

b. $-\frac{1}{2}\cos a+\frac{\sqrt{3}}{2}\sin a$

c. $-\frac{1}{2}\cos a-\frac{\sqrt{3}}{2}\cos a$

d. $-\frac{1}{2}\cos a-\frac{\sqrt{3}}{2}\sin a$

e. $-\frac{1}{2}+\sin a$

5. Which of the following is true?

I. The terminal side of an angle of 4 is in Quadrant III.

II. The smallest positive angle coterminal with $\frac{19\pi}{4}$ is $\frac{3\pi}{4}$.

III. If $\sec\theta<0$ and $\cot\theta<0$, then the terminal side of θ must lie in Quadrant III.

a. *III* *b.* *I*

c. *II,III* *d.* *I,II*

e. *I,III*

6. Determine the exact value of $\cos\theta$ given $\tan\theta=-\frac{1}{4}$ and $\sin\theta>0$.

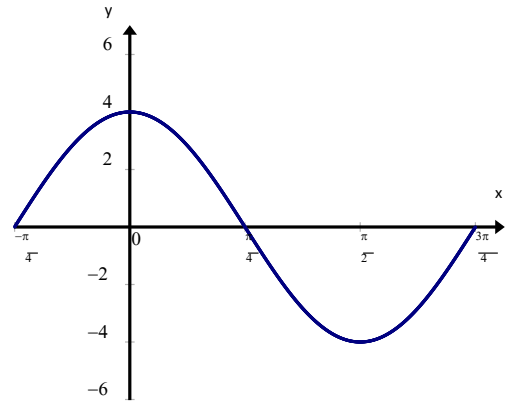
a. $\frac{-4\sqrt{17}}{17}$ *b.* $\frac{-\sqrt{15}}{15}$

c. $\frac{-\sqrt{17}}{17}$ *d.* -1

e. -4

7. One complete period of a trigonometric function is graphed at the right.

Which of the following functions is the associated equation?



a. $y = 4\sin\left(2x - \frac{\pi}{2}\right)$ *b.* $y = 4\sin\left(2x + \frac{\pi}{2}\right)$

c. $y = 4\sin\left(2x - \frac{\pi}{4}\right)$ *d.* $y = 4\sin\left(x + \frac{\pi}{4}\right)$

e. $y = 4\sin(4x + \pi)$

8. Rewrite $\sin\left(\cos^{-1}(x)\right)$ as an expression in *x* assuming $x > 0$:

a. $\sqrt{1 - x^2}$ *b.* $\frac{\sqrt{1 - x^2}}{x}$

c. $\frac{\sqrt{1 + x^2}}{x}$ *d.* $\frac{1}{x}$

e. x

9. Which of the following statements is/are true?

I. The range of $f(x) = \frac{1}{(x-10)^2}$ is $(0, \infty)$

II. The horizontal asymptote for $g(x) = \frac{2x-5}{3x^2-7}$ is $y = \frac{2}{3}$

III. The x-intercept for $g(x) = \frac{2x}{x^2-9}$ is $(0,0)$.

a. *I* *b.* *II*

c. *I,III* *d.* *II,III*

e. *III*

10. Solve the system: $\begin{cases} x^2 - y = 1 \\ 2x^2 + 3y = 17 \end{cases}$

Which of the following statements is true?

***a*. There is only one point of intersection.**
***b*. There are two points of intersection.**
***c*. There are three points of intersection.**
***d*. There are an infinite number of points of intersection.**
***e*. There are no points of intersection.**

11. Determine the exact value of $\sin(2\theta)$ given $\sin\theta = \frac{-2}{5}$ and $\tan\theta > 0$

***a*.** $\frac{-4\sqrt{21}}{25}$ ***b*.** $\frac{4\sqrt{21}}{25}$

***c*.** $\frac{-4}{5}$ ***d*.** $\frac{2\sqrt{21}}{25}$

***e*. None of the preceding**

12. An airplane is flying at an elevation of 5200 feet directly above a straight highway. Two motorists are driving cars on the highway on opposite sides of the plane, and the angle of depression to one car is 34° and to the other is 57°. How far apart are the cars?

***a*. 11,514 feet** ***b*. 7,143 feet**
***c*. 10,400 feet** ***d*. 11,086 feet**
***e*. None of the preceeding**

13. Find the partial fraction decomposition for the expression $\frac{-8x+32}{x^2-4x-12}$. The numerator of the fraction with denominator $x-6$ is:

***a*. -3** ***b*. -2**

***c*. -8** ***d*. 32**

***e*. 6**

14. Approximate the radius of the circle if an arc of length 4 feet on the circle subtends a central angle of 35°. Approximate your answer to the nearest hundredth.

***a*. 0.11 feet** ***b*. 2.44 feet**

***c*. 140.00 feet** ***d*. 6.55 feet**

***e*. 5.23 feet**

Name: _____ Section: _____ 3-A1

For each of the following problems, write clearly and show work for those problems requiring several steps.

15. (10 pts.) Verify algebraically that the following statement is an identity: $\dfrac{\sin A}{1-\cos A} - \cot A = \csc A$ **.**

Please use the correct structure for a mathematical proof.

16. (16 pts) Short answer. Please rationalize when applicable.

a. Determine the exact value of $\sin\left(\dfrac{5\pi}{3}\right)$ _____

b. Determine the exact value of $\sec\left(\dfrac{7\pi}{6}\right)$ _____

c. Determine the exact value of $\cos^{-1}\left(-\dfrac{\sqrt{2}}{2}\right)$ _____

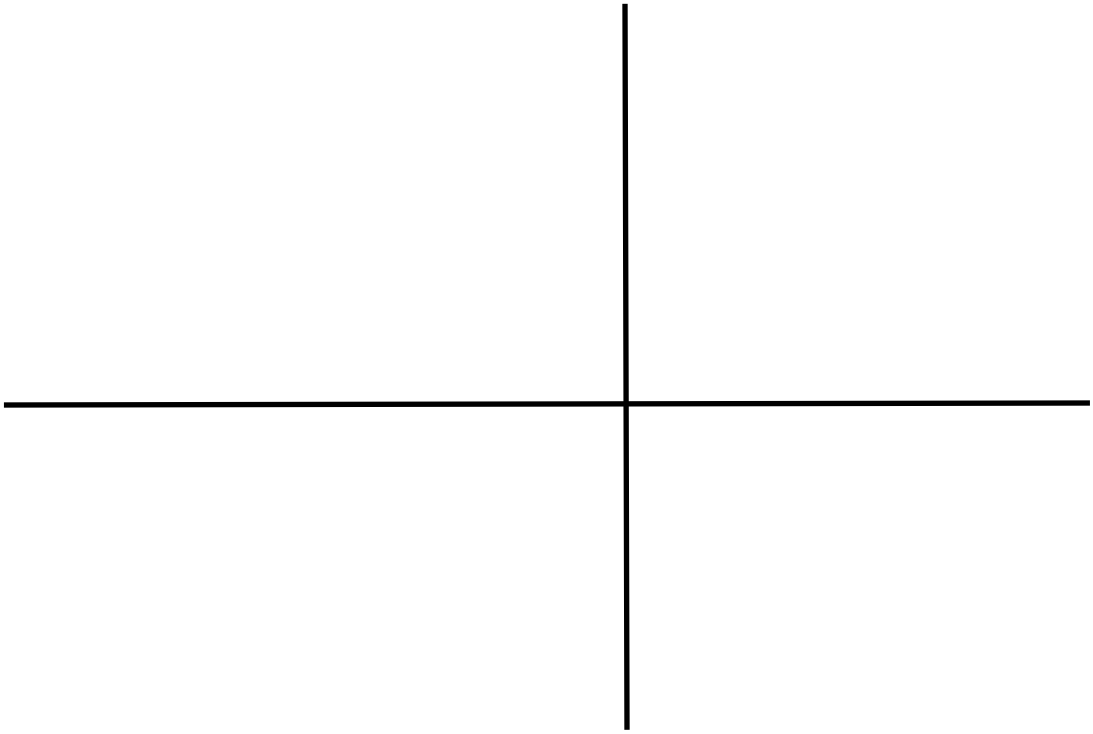
d. What is the period of $y = \tan x$ **?** _____

17. (14 pts.) Let $f(x)=\dfrac{(x-4)(x+2)}{(x-1)(x+6)}$ **.**

a. List all asymptotes: _____

b. List all x-intercepts: _____

c. NEATLY graph f(x) clearly indicating all asymptotes, x-intercepts, and any other analysis as was done in your class.



ANSWERS

1. **C**
2. **A**
3. **C**
4. **D**
5. **D**
6. **A**
7. **B**
8. **A**
9. **C**
10. **B**
11. **B**
12. **D**
13. **B**
14. **D**
15. **PROOF:**

$$LHS = \frac{\sin A}{1-\cos A} - \frac{\cos A}{\sin A} = \frac{\sin^2 A - \cos A(1-\cos A)}{(1-\cos A)(\sin A)} = \frac{\sin^2 A - \cos A + \cos^2 A}{(1-\cos A)(\sin A)} =$$

$$\frac{(1-\cos A)}{(1-\cos A)(\sin A)} = \frac{1}{\sin A} = \csc A = RHS$$

16. ***a***. $\frac{-\sqrt{3}}{2}$ ***b***. $\frac{-2\sqrt{3}}{3}$ ***c***. $\frac{3\pi}{4}$ ***d***. π

17. ***a***. $x = 1, x = -6, y = 1$ ***b***. $(4,0)$ and $(-2,0)$

c.