Math 1149
Spring 2013

Midterm 2
Form A

Name: _____
OSU user name (name.nn): _____
Instructor: _____
Class Time: _____

The point value of each problem is indicated. To obtain full credit you must have the correct answers along with **the supporting work**. Answers without supporting work will receive no credit, except for multiple choice problems. **CIRCLE YOUR ANSWERS**.

1. (20 points) **Circle your answer, or fill in the blank.**

   (a) The range of the function $f(x) = \sin^{-1}(x)$ is:

   i) $[-1, 1]$ ii) $[0, \pi]$ iii) $[-\frac{\pi}{2}, \frac{\pi}{2}]$ iv) not listed

   (b) The statement, "$\cos(\cos^{-1}(x)) = x$ for all real numbers x" is

   i) True ii) False

   (c) The exact value of $\cos^{-1}(\cos(\frac{9\pi}{8}))$ is:

   i) $\frac{9\pi}{8}$ ii) $\frac{-\pi}{8}$ iii) $\frac{7\pi}{8}$ iv) not listed

   (d) Given a triangle for which one side and three angles are known, which law is used in solving for the second side?

   i) Law of Sines ii) Law of Cosines

   (e) The exact value of $\sin(\sin^{-1}(3))$

   i) equals 3 ii) does not exist iii) is not listed

2. (a) (6 points) Rewrite the expression $\cos(\tan^{-1}(x))$ as an <u>algebraic</u> expression.

(b) (6 points) Write the expression $3\csc(x)\tan(x) + \sec(x)$ in terms of $\cos(x)$ only.

(c) (8 points) Find the <u>exact</u> value of $\cos(\frac{x}{2})$ if $\sec(x) = \frac{7}{2}$, and $270° < x < 360°$.

3. (20 points) **Circle your answer**.

(a) Simplify $\tan(x + \frac{\pi}{4})$.

i) $\tan(x) + 1$ ii) $\frac{\tan(x)+1}{1-\tan(x)}$ iii) $\frac{\tan(x)-1}{1+\tan(x)}$ iv) not listed

(b) The expression $\sin(x)\cos(50) - \cos(x)\sin(50)$ equals:

i) $\sin(x - 50)$ ii) $\sin(x + 50)$ iii) $\sin(50 - x)$ iv) not listed

(c) Write $\cos(2\cos^{-1}(4x))$ in terms of x only.

i) $32x^2 - 1$ ii) $8x$ iii) $8x^2 - 1$ iv) not listed

(d) The solutions of the trigonometric equation $\tan(5x) - \sqrt{3} = 0$ are:

i) $\frac{\pi}{15} + k\pi$ ii) $\frac{\pi}{15} + \frac{k\pi}{5}$ iii) $\frac{5\pi}{3} + 5k\pi$ iv) not listed

where k is an integer.

4. (20 points)

(a) (10 points) A car travels along a straight road for 30 minutes, then travels 20° to the left of its original course for 15 minutes. How far is the car from the starting point if it traveled at a constant speed of 10 mph for the entire trip?

(b) (10 points) Solve the trigonometric equation: $2\cos^2(\theta) - 5\cos(\theta) - 3 = 0$.

5. (20 points) **Circle your answer**.

(a) Find the exact value of $\cos(\csc^{-1}(\frac{5}{2}))$.

i) $\frac{2}{5}$ ii) $\frac{5}{2}$ iii) $\frac{\sqrt{21}}{5}$ iv) not listed

(b) Simplify $\left(\frac{1-\cos(3x)}{\sin(3x)}\right) - \left(\frac{\sin(3x)}{1+\cos(3x)}\right)$.

i) 0 ii) 1 iii) $\frac{2\sin(3x)}{1+\cos(3x)}$ iv) not listed

(c) A triangle has sides $a = 10$, $b = 7$, and angle $\angle A = 140°$. Find angle $\angle B$.

i) $66.7°$ ii) $26.7°$ iii) no solution iv) not listed

(d) Find $\sin(2x)$ if $\sin(x) = \frac{3}{7}$ and x is in quadrant II.

i) $\frac{12\sqrt{10}}{49}$ ii) $\frac{-6\sqrt{10}}{49}$ iii) $\frac{-12\sqrt{10}}{49}$ iv) not listed

Formulas

- $\sin^2(\theta) + \cos^2(\theta) = 1$
- $1 + \tan^2(\theta) = \sec^2(\theta)$
- $1 + \cot^2(\theta) = \csc^2(\theta)$
- $\sin(x + y) = \sin(x)\cos(y) + \cos(x)\sin(y)$
- $\cos(x + y) = \cos(x)\cos(y) - \sin(x)\sin(y)$
- $\tan(x + y) = \dfrac{\tan(x) + \tan(y)}{1 - \tan(x)\tan(y)}$
- $\sin(2x) = 2\sin(x)\cos(x)$
- $\cos(2x) = \cos^2(x) - \sin^2(x) = 2\cos^2(x) - 1 = 1 - 2\sin^2(x)$
- $\sin(\dfrac{x}{2}) = \pm\sqrt{\dfrac{1 - \cos(x)}{2}}$
- $\cos(\dfrac{x}{2}) = \pm\sqrt{\dfrac{1 + \cos(x)}{2}}$