

December 4, 1996

Math 6
Exam 2
Form IC

Name _____
Section _____
Instructor _____

1. (10 pts) Match the following inverse trigonometric functions with one of the following values (A-H). Letters can be used more than once.

(a) $\arcsin\left(-\frac{\sqrt{2}}{2}\right) = \underline{\hspace{2cm}}$

A. $\frac{11\pi}{6}$

E. $\frac{1}{2}$

B. $\frac{\pi}{6}$

F. $\frac{7\pi}{4}$

C. $-\frac{\pi}{6}$

G. $\frac{\pi}{4}$

(b) $\tan^{-1}(-\sqrt{3}) = \underline{\hspace{2cm}}$

D. $-\frac{\pi}{3}$

H. $-\frac{\pi}{4}$

(c) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = \underline{\hspace{2cm}}$

I. $\frac{\pi}{3}$

(d) $\cos^{-1}\left(\frac{\sqrt{2}}{2}\right) = \underline{\hspace{2cm}}$

(e) $\arctan(1) = \underline{\hspace{2cm}}$

2. (12 pts) Find the exact value of the expression: If a solution does not exist, write "DNE".

(a) $\arccos\left(\cos\left(-\frac{\pi}{4}\right)\right) = \underline{\hspace{2cm}}$

(b) $\cos(\tan^{-1}1) = \underline{\hspace{2cm}}$

(c) $\tan(\tan^{-1}(-5)) = \underline{\hspace{2cm}}$

(d) $\cos(\cos^{-1}\pi) = \underline{\hspace{2cm}}$

3. (10 pts) Match the trigonometric expression with one of the following simplified expressions (A-J). Letters can be used more than once.

(a) $\frac{\cot x}{\csc x} = \underline{\hspace{2cm}}$

A. $\sin x$

B. $\tan x$

C. $\sec^4 x$

D. $\cos x$

E. $\sec^2 x$

F. $-\tan x$

G. $\cot x$

H. $\tan^2 x$

I. $-\tan^2 x$

J. 1

(b) $(\sec x + 1)(\sec x - 1) = \underline{\hspace{2cm}}$

(c) $\cot\left(\frac{\pi}{2} - x\right)\cos x = \underline{\hspace{2cm}}$

(d) $\tan^4 x + 2\tan^2 x + 1 = \underline{\hspace{2cm}}$

(e) $\frac{-\cos(-x)}{\sin(-x)} = \underline{\hspace{2cm}}$

4. (30 pts) Verify the following identities. Only work from 1 side. Work must be neat!

(a)
$$\frac{1 + \cos t}{\sin t} + \frac{\sin t}{1 + \cos t} = 2 \csc t$$

(b)
$$\sin x(1 - 2 \cos^2 x + \cos^4 x) = \sin^5 x$$

(c)
$$\frac{\cos(-x)}{1 + \sin(-x)} = \sec x + \tan x$$

5. (28 pts) Find all solutions in the interval $[0, 2\pi)$ of the following trigonometric equations. Show all work!
Give exact solutions.

(a) $1 - \sin t = \sqrt{3} \cos t$

(b) $4 \tan^2 \theta = 3 \sec^2 \theta$

(c) $\cot x \cos^2 x = 2 \cot x$

6. (10 pts) From a point 50 feet in front of a church, the angles of elevation to the base of the steeple and the top of the steeple are 35° and 47° , respectively. Find the height of the steeple and the height of the church without the steeple. (Round answers to the nearest whole number.)

BONUS

7. (10 pts) A ship is 45 miles east and 30 miles south of port. If the captain wants to sail directly to port, what bearing should he take? What is the distance to port?
