Name_____

Instructor_____

Math 6,   Exam 2
Monday, November 24, 1997

Examination Rules:

1.   If you have a question, please raise your hand.

2.   All work must be shown.

3.   Use <u>exact</u> values, unless asked to do otherwise.

4.   Please circle your final answer.

DO NOT TURN PAGE UNTIL TOLD TO DO SO.

1. (5 pts.) Use the trigonometric substitution $x = 3 \sin \theta$ to write

$$\sqrt{27 - 3x^2}$$

as a trigonometric function of θ, where $0 < \theta < \pi/2$.

2. (12 pts.) Matching:

$$\dfrac{1 + \sec x}{\sin x + \tan x} = \underline{\hspace{2cm}}$$

A) csc x - 1

B) sec x + tan x

$$\dfrac{\cos(-x)}{1 + \sin(-x)} = \underline{\hspace{2cm}}$$

C) csc x

D) 1 + cot(-x)

$$\dfrac{\cot^2 x}{\csc x + 1} = \underline{\hspace{2cm}}$$

E) csc x + sin x

3. (2 pts each) Clearly indicate whether the following statements are **true** or **false**:

_____ sec x cos y = 1

_____ 1/(5 cos θ)=5 sec θ

_____ $\cos(\dfrac{\pi}{2} - x) = cscx$

_____ A point moving in simple harmonic motion described by the equation d=2 sin(4π x) has a frequency of 2 cycles/unit time.

4. (10 pts. each) Verify the following identities:

A) $\dfrac{\sin^3 x + \cos^3 x}{\sin x \cos x} = \sin x \tan x + \cos x \cot x$

B) $\dfrac{1 - \cos x}{\cos x} = \dfrac{\tan^2 x}{\sec x + 1}$

C) $\dfrac{^2\theta - 1}{1 - \sin\theta} = \dfrac{1 + \sin\theta}{\sin^2\theta}$

7.   (5 pts.) If $\sin(-x) = -\dfrac{2}{3}$ and $\tan x = -\dfrac{2}{\sqrt{5}}$, find the values of the other trigonometric functions.

8.   (10 pts.) A ship leaves port traveling due south. After 30 minutes, the ship must change course to S 32° E to avoid a storm. If the ship maintains a speed of 20 knots, how far south will the ship have traveled 2 hours after leaving port?

5. (10 pts.) Find **all** solutions of the equation $\sin x \cos x - \cos x = 0$. Use exact values.

6. (10 pts. each) Find all solutions of the following equations in the interval $[0, 2\pi)$:

A) $2\sin^2(3x) = 1$

B) $\dfrac{1 + \sin x}{\cos x} + \dfrac{\cos x}{1 + \sin x} = -2$