

171 FINAL EXAM DECEMBER 18, 2003

NAME: _____

T.A.: _____

INSTRUCTIONS: Show all your work. Answers alone will receive little or no credit. Be neat. We do not want to be required to guess at what you're doing. We must be able to see how you got to your answer. **Take your time and be careful with your calculations. A mistake early in your work could be costly.** There are two parts to the exam. Part I is review material. Part II is newly covered material. Each part is worth 100 points.

1. _____ 7. _____

2. _____ 8. _____

3. _____ 9. _____

4. _____ 10. _____

5. _____ 11. _____

6. _____ 12. _____

TOTAL _____

PART I

1. (16 p'ts.) From a point A which is 8.2 meters above level ground, the angle of elevation of the top of the building is $31^{\circ}20'$ and the angle of depression of the base is $12^{\circ}50'$. Approximate the height of the building.

Ans. _____

2. (20 p'ts.) $x^2 + y^2 = 1$ is the equation for a circle of radius 1. There are two lines tangent to this circle and passing through the point $(2, 0)$. One has positive slope and one has negative slope. Find the equation for the tangent with positive slope.

Ans. _____

3. (16 p'ts.) Find the inverse function of $f(x) = \sqrt{9 - x^2}$; $-3 \leq x \leq 0$.

Ans. $f^{-1}(x) =$ _____

Domain(f^{-1}) = _____

4. (16 p'ts.) Solve for x .

$$\frac{x}{x^2 - 1} \geq 0.$$

Ans. _____

5. (16 p'ts.) Evaluate $\lim_{x \rightarrow 2^-} \frac{x^2 - x - 2}{|x - 2|}$.

Ans. _____

6. (16 p'ts.) Let $f(x) = \frac{x^2 - x - 2}{|x - 2|}$ for all $x \neq 2$. Is there a value we can assign to $f(2)$ to make f continuous at $x = 2$? If so, what value should we assign? If not, why not?

Ans. _____

PART II

7. (16 p'ts.) Find the exact values of

a) $\tan^{-1}(\tan(\frac{7\pi}{4}))$.

b) $\csc(\tan^{-1}(-1))$.

Ans.a) _____, b) _____

8. (16 p'ts.) Show that $|\sin 2x - \sin 2y| \leq 2|x - y|$ for any x and y . (Hint: You may want to consider using the Mean Value Theorem.)

9. (16 p'ts.) Express $f(x) = \cos 4x + \sqrt{3}\sin 4x$ in the form $f(x) = A \cos(Bx + C)$ for some A , B and C . Determine the amplitude, period and phase shift.

Ans. $f(x) =$ _____

amplitude = _____, period = _____,

phase shift = _____

10. (20 p'ts.) One starts with a rectangular sheet of cardboard 8 feet by 5 feet. One then cuts out the same size square from each corner and folds up the sides making an open rectangular box. What size squares should be cut out of each corner in order to maximize the volume of the resulting box?

Ans. _____

11. (16 p'ts.) A metal disk expands during heating. If its radius increases at a rate of .01 inches per second, how fast is the area of one of its faces increasing when the radius is 8 inches?

Ans. _____

12. (16 p'ts.) Find all solutions to $2 \sin^3 x - \cos^2 x - 2 \sin x = 0$ in the interval $[0, 2\pi)$.

Ans. _____

