Name:_____

Test 3 Spring 2007 MATH 121 Section 02 March 23, 2007

Directions : You have 50 minutes to complete all 6 problems on this exam. There are a possible 100 points to be earned. You may not use your book, notes, or any graphing/programmable calculator. Please be sure to show all pertinent work. An incorrect answer with no work will receive no credit! If any portion of the exam is unclear please come to me and I will elaborate provided I can do so without giving away the problem. 1. (10 points) If $z^2 = x^2 + y^2$, dx/dt = 2, and dy/dt = 3, find dz/dt when x = 5 and y = 12.

2. (20 points)

A man starts walking north at 4 ft/s from a point P. Five minutes later a woman starts walking south at 5 ft/s from a point 500 ft due east of P. At what rate are the people moving apart 15 min after the woman starts walking?

3. (20 points) Use differentials (or, equivalently, a linear approximation) to estimate $(8.06)^{2/3}$.

4. (10 points)

The circumference of a sphere was measured to be 84 cm with a possible error of 0.5 cm.

- (a) Use differentials to estimate the maximum error in the calculated surface area. $(A=4\pi r^2)$
- (b) Use differentials to estimate the maximum error in the calculated volume. $(V=\frac{4}{3}\pi r^3)$

5. (20 points)

Find the absolute maximum and absolute minimum values of

$$f(x) = \frac{x}{x^2 + 1}$$

on the interval [0, 2].

6. (20 points) Show that the equation $1 + 2x + x^3 + 4x^5 = 0$ has exactly one real root. (Please write complete sentences.)