

Math 170-004
October 19, 2005

Exam 2 Name _____

This test consists of 100 points spread over 6 pages, none of which is intentionally left blank. Take a few seconds right now to be sure you have all the pages. The point value of each question is to the left of the question number. Show all your work in the space provided. If you run out of room for an answer, continue working on the back of the page. Your answers must be justified by your work.

1. Find the indicated derivatives:

(10) (a) $f'(3)$ if $f(x) = \frac{1}{\sqrt{12x}}$

(10) (b) $\frac{d}{dx} \left(\frac{x+7}{\sqrt{x^2+2}} \right)$

(10) (c) $z'(s)$ if $z(s) = \cos^2(s) - \sin^2(s)$

(10) (d) $\frac{dy}{dx}$ if $(x + y)^4 + 4xy = -7$.

(10) (e) y' if $y = \sin^{-1}(3x)$

(10) 2. Find

$$\lim_{x \rightarrow 0} \frac{\sin(3x)}{\sin(2x)}$$

- (10) 3. Assume that oil spilled from a ruptured tanker spreads in a circular pattern whose radius increases at a rate of 5 ft/sec. How fast is the area of the spill increasing when the radius of the spill is 40 feet?

- (15) 4. Two taxicabs begin at the same time at the intersection of 9th St. and Main St. One heads south on 9th at 40mph and the other heads east on Main at 30 mph. Both have the good fortune not to be stopped by traffic lights or slowed by other traffic. When the taxi on 9th has gone one half a mile, how fast is the distance (as the crow flies) between the cabs changing?

(10) 5. What is an equation of the tangent to the graph of $f(x) = \sqrt{x+5}$ at the point $(4, 3)$

(5) 6. Use a linear approximation to $f(x) = \sqrt[4]{x}$ to approximate $\sqrt[4]{257}$ (Hint: $4^4 = 256$)