

## MATH 170 – Section 006 – Quiz 10

You may work with other class members on this quiz, but you may *not* receive assistance from people not in your MATH 170 section. You must show all of your work to receive full credit. Do all your work on other sheets of paper and be sure to staple all the pieces of paper together or YOU WILL GET A 'ZERO' ON THE QUIZ. Do not use decimal approximations unless asked to do so. Your work on this quiz must be handed in by the beginning of class on Friday, 20 November 2009. GOOD LUCK!

- 1) Let  $f(x) = 3x^5 - 5x^4$ .
  - a) Determine for which values of  $x$  that  $f$  is concave up and for which values of  $x$  that  $f$  is concave down.
  - b) Determine all inflection points of  $f$ .

- 2) Evaluate the following limits:

- a)  $\lim_{x \rightarrow \pi} (\csc x + \cot x)$

- b)  $\lim_{x \rightarrow \infty} x^{\frac{1}{\ln \sqrt{x}}}$

- 3) Use Newton's method to find the smallest positive solution to the equation

$$1 - \frac{x}{2} = \tan x.$$

Make a good choice for the initial guess and then apply Newton's method until two successive iterates agree to three places to the right of the decimal point. (Of course, you will use decimal approximations for this problem).

- 4) Find the most general antiderivative of the function

$$f(x) = \frac{3}{x^2} - 4e^{-3x} + 3\sqrt{x} - 3 \sin 4x + \frac{6}{x}$$

- 5) A ball is thrown upward from the edge of a cliff that is 240 feet above the ground. The ball hits the ground at the base of the cliff 5 seconds later. With what speed was the ball thrown? We neglect the effect of air resistance; thus the magnitude of the acceleration of the ball is  $32 \text{ ft/sec}^2$ .

Extra credit: Provide a specific example that illustrates the situation depicted in Figure 4.48 on page 294 of our text. That is, you need to find a (non-piecewise defined) function  $f$  with root  $r$  and initial guess  $x_0$  such that when Newton's method is applied, you obtain  $x_0 = x_2 = x_4 = \dots$  and  $x_1 = x_3 = x_5 = \dots$  and  $x_0 \neq x_1$ .