

Name:

3/13/06

Math 251 Quiz 7

Be sure to show all your work and justify all your answers unless stated otherwise.

1. (5pts) Finish the statement of the Mean Value Theorem:

Let f be a function with

- (1) f is continuous on the closed interval $[a, b]$.
- (2) f is differentiable on the open interval (a, b)

Then...

2. (10pts) Find all numbers c that satisfy the conclusion of the Mean Value Theorem for the function f on the interval $[1, e]$ where

$$f(x) = \ln(x)$$

3. (2pts each) Evaluate the following limits (you do NOT need to show any work)

$$\lim_{x \rightarrow 0^-} \left(\frac{1}{x}\right)$$

$$\lim_{x \rightarrow \infty} e^{-x}$$

$$\lim_{x \rightarrow \infty} \ln(\sqrt{x})$$

$$\lim_{x \rightarrow 0} (\cos^2(x) - x)$$

4. (10pts) Let

$$f(x) = \frac{1}{6}x^6 - \frac{2}{5}x^5 + \frac{1}{4}x^4 + 29$$

Find the intervals where f is increasing and the intervals where f is decreasing.

5. (10pts) Let

$$f(x) = \frac{1}{2}x^4 + x^3 - 18x^2 + 14x + 214$$

Find the intervals where f is concave up and the intervals where f is concave down, and state the x -coordinate of all inflection points.

6. (10pts) Find all local minimum and maximum values of f where

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