

April 14, 2007.

Math 121A

Name _____

Instructor: _____

Lab Section time _____

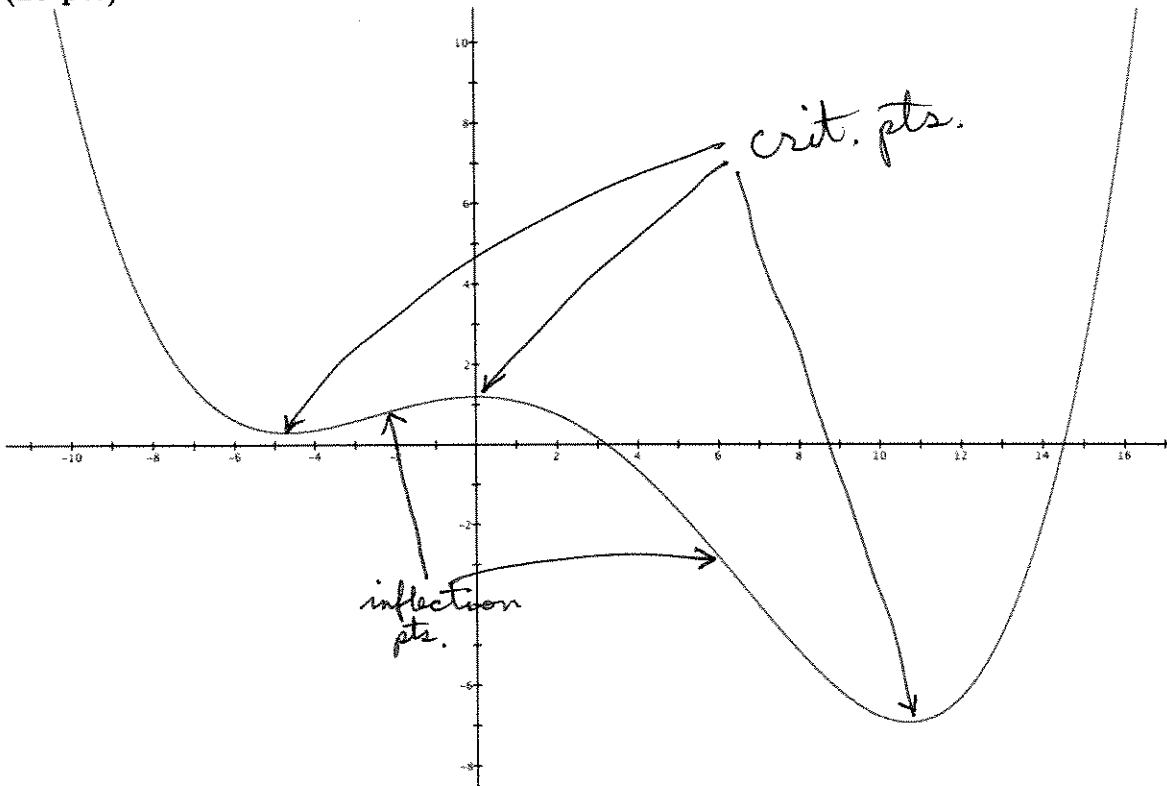
Midterm #3
THEORETICAL EXAM

PRACTICE VERSION of the index card and simple scientific calculators only portion.

1. (30 pts) Consider $f(x) = x^3 - 12x^2 + 45x - 50$.

- Find all critical points (x_c, y_c) of f . $(3, 4)$ and $(5, 0)$
- Find all inflection points (x_{ip}, y_{ip}) of f . $(4, 2)$
- Consider f limited to the domain $x \in [0, 8]$. Find the interval of x values for which the function f is increasing in this interval. $[0, 3)$ and $(5, 8]$
- Consider f limited to the domain $x \in [0, 8]$. Find the interval of x values for which the derivative of the function f is increasing (the function f is concave up) in this interval. $[4, 8]$

2. (20 pts)



- On the graph of the function above, label all critical points.
- On the graph of the function above, label all points of inflection.

3. (30 pts) Find the derivatives of the functions below:

• $f(x) = x^3 - 12x^2 + 45x - 50.$

$$f'(x) = 3x^2 - 24x + 45$$

• $f(x) = 3x^{-2} + 5\sqrt{x} + 7.$

$$f'(x) = -6/x^3 + \frac{2.5}{\sqrt{x}}$$

• $f(x) = 8\exp(-2x) + 3\ln(4x)$

$$f'(x) = -16e^{-2x} + \frac{3}{x}$$

• $f(x) = \frac{2}{x^3} + \exp(5x) - 7\ln(\sqrt{6x}) + 9$

$$f'(x) = -6/x^4 + 5e^{5x} - \frac{7}{2x}$$

4. (20 pts) Find the slope of the secant line between the point $(3, f(3)) = (3, \overset{4}{\cancel{4}})$ and the points $(3+h, f(3+h))$ on the graph of $f(x) = x^3 - 12x^2 + 45x - 50$ for $h = 2$ and $h = 1$.

Also find

$$\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$$

$$h=2: \frac{f(5) - f(3)}{2} = -2$$

$$h=1: \frac{f(4) - f(3)}{1} = -2$$

$$\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h} = 0$$