## **Honors Analysis**

Copy original problem.

Convince me that you understand the concept!

ton 2 Errom

## I

Π

T

Given 
$$f(x) = \begin{cases} \frac{2}{3}x + 1 & -3 < x < -1 \\ 3 & x = -1 \\ -x - 2 & -1 < x < 1 \\ x - 4 & 1 < x < 3 \\ -\frac{4}{3}x + 3 & 3 \le x < 5 \end{cases}$$
 (20 pts tot)

- Prove f(x) is or is not continuous at x = -1a)
- b) Prove f(x) is or is not continuous at x = 1
- c) Prove f(x) is or is not continuous at x = 3

Using the definition of the derivative which yields a function,

find 
$$f'(x)$$
 given  $f(x) = x^2 + 1$ . (15 pts)

III Given  $f(x) = |x^2 - 4|$ . Using the first definition of the derivative, **PROVE** f'(2) does not exist. (15 pts)

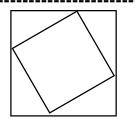
V Given 
$$f(x) = 4x^3 - 12x^2 + 8$$
 (35 pts tot)

- State the coordinates of all x-intercepts of f(x). a)
- State the intervals (using proper notation) where f(x) is increasing; decreasing. b)
- c) Identify and state the coordinates of all extrema. **Justify**.
- d) State the coordinates of any Points of Inflection. Justify.
- Draw an accurate graph of f(x). Specifically show all coordinates found above. e)

Find the following limits. (If they do not exist, explain fully how you know that.) (5 pts ea)

a) 
$$\lim_{x \to 1} \frac{x+1}{x^2-1}$$
 b)  $\lim_{x \to 2} \frac{x^3-8}{x-2}$  c)  $\lim_{x \to 3} \frac{\sqrt{x-1}}{\sqrt{x-5}}$ 

Extra Credit ------ 5 pts -----



A square of perimeter 20 is inscribed in a square of perimeter 28. What is the maximum distance between a vertex of the inner square and a vertex of the outer square?

Name

Per

Date