Honors Analysis
Copy original problem.
Convince *me* that **you** understand the concept!
No Calculators.

Name ______________________________

Per __________ Date ____________

Chapter 3 Exam

I

Definition of the derivative: (10 pts ea)

a) Using the *definition of the derivative* which yields a **function**, find $f'(x)$ given $f(x)=\dfrac{1}{x+1}$.

b) Using the *definition of the derivative* which yields a **number**, find $f'(2)$ given $f(x)=\dfrac{1}{x+1}$.

II

Given $f(x)=3(x-1)^2$. Find the equation of the tangent line to $f(x)$ at $x = 2$. (10 pts)

III

Find the following limits: (5 pts ea)

a) $\displaystyle\lim_{x\to 3}\frac{x^2-3x}{x^2-4x+3}$

b) $\displaystyle\lim_{x\to 2}\frac{x^3-8}{x-2}$

IV

Determine ***a*** and ***b*** so $f(x)$ is continuous in the **interval** [0, 3]. (tot 25 pts)

given: $f(x)=\begin{cases} x^2 & \text{if } 0\le x\le 1 \\ ax+3 & \text{if } 1<x<2 \\ x^2-b & \text{if } 2\le x\le 3 \end{cases}$

V

Given $f(x)=x(x-3)^2 \quad D_f \quad x \;\varepsilon\; [-1,\ 4]$. (tot 35 pts)

a) Determine the coordinates of *all* extrema. Identify as global or local. Justify!

b) Determine coordinates of all points of inflection.

c) Sketch $f(x)$.

Extra Credit ______________ **5 pts** ______________

Jack can run around a circular track in forty seconds. Jill, running in the opposite direction, meets Jack every fifteen seconds. What is Jill's time to run around the track, expressed in seconds?