

Honors Analysis

Name _____

Copy original problem.

Per _____

Date _____

Convince *me* that **you** understand the concept!

Chapter 3 Exam

I Given $f(x)$, find $f'(x)$: (5 pts ea)

a) $(4x^3 - 5x)^2$

b) $x^\pi + 3$

c) $4^2 - 1$

II Using the “definition of the derivative” which yields a function, find $f'(x)$: $f(x) = (2x - 3)^2$ (15 pts)**III** Given $f(x) = \begin{cases} x^2 & ; x \leq 1 \\ 2x - 1 & ; x > 1 \end{cases}$ (15 pts ea)a) **Prove** $f(x)$ is or is not continuous at $x = 1$. b) **Prove** $f'(1)$ does or does not exist.Given: $f(x) = x^4 - 4x^3$ (30 pts tot)**IV** a) Find $f'(x)$ and $f''(x)$. Draw appropriate “number line” graphs.b) Find the *coordinates* of the critical points. Identify them as max, min or P.I.c) Determine the *coordinates* of any PI which are NOT critical values.d) Specifically *state the interval(s)* where $f(x)$ is concave up.e) Specifically *state the interval(s)* where $f(x)$ is decreasing.f) Sketch the graph of $f(x)$.**V** Determine the following limits: (5 pts ea)

a) $\lim_{x \rightarrow 2} \frac{\sqrt{x^2 + 5} - 3}{x - 2}$

b) $\lim_{x \rightarrow 0} \sqrt{1 + \frac{1}{x}} - \sqrt{\frac{1}{x}}$

c) $\lim_{x \rightarrow 1} \left[\frac{1}{1 - x^3} - \frac{1}{3(1 - x)} \right]$

Extra Credit ----- 5 pts -----Given $f(x) = ax^3 + bx^2$.Determine a and b so the graph of $f(x)$ will have a point of inflection at $(1, 2)$.