Advanced Placement Calculus Name _____

Copy original problem. Per _____ Date _____

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

No Calculators.

Chapter 1 Exam

I Given: $f(x) = 3x^4 + 2x^3$. Determine the *x*-intercept of the tangent line to $f(x)$ at $(-1,1)$. (10 pts)

II Solve $\forall \; x \; \varepsilon \; \Re$. Graph the solution set on a *well labeled* numberline. Be especially sure that the reasons for your steps are very clear. (10 pts ea)

a) $\left|\frac{x-2}{x+2}\right| > 1$ b) $\frac{5}{1-x} < 3$ c) $\left|2x + |x-3|\right| < 2$

III Using the *definition of the derivative* which uses $h \to 0$, find $f'(x)$ given $f(x) = \frac{1}{2x+1}$. (10 pts)

IV Given: $f(x) = |2x-3| - |4-x|$ (25 pts tot)

a) Graph the solution to $f(x) \geq 8$.

b) Rewrite $f(x)$ as a piece-wise function.

c) Sketch the graph of $f(x)$ on a standard cartesian axis.

V Find the following limits (5 pts ea)

a) $\lim_{x \to 3} \frac{\frac{1}{x} + \frac{1}{2}}{x-2}$ b) $\lim_{x \to -3} \frac{x^3 + 27}{x+3}$ c) $\lim_{x \to 0} \frac{\sqrt{x+4} - 2}{x}$

d) $\lim_{x \to 0} \frac{x^2 + \frac{1}{x}}{x^2 - \frac{1}{x}}$ e) $\lim_{x \to 0} (1-3x)^{\frac{2}{x}}$

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

Confirm that: $\frac{1}{2} = \frac{1}{3} + \frac{1}{6}$ and $\frac{1}{3} = \frac{1}{4} + \frac{1}{12}$.

Represent these three fractions in a similar manner: $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$