EXAM 3 B

PRINT NAME _____

(1) Find the most general Antiderivative for each of the following

a) $f(x) = x^3 - 4x^2 + 17$

b) $g(T) = \sin T - 2\cos T$

c) $h(x) = \sqrt[5]{x^3} + \sqrt[3]{x^5}$

(2) Given that the graph of f passes through the point $(1,5)$ and the slope of its tangent line @ $(x, f(x))$ is $2x-1$, find $f(2)$

a] (3) If an object moves so that the acceleration at time t is given by $a(t) = t^2 + 3\cos t$ in m/s^2 and its initial velocity is 3 m/s and its initial position is 2m

a) Find the velocity as a function of time t (be as specific as possible)

$v(t) =$

b) Find the position as a function of time t (be specific)

$s(t) =$

] (4) Find the Absolute Maximum and Minimum values of the function $f(x) = x^2 + \frac{2}{x}$ on the interval $\left[\frac{1}{2}, 2\right]$. Showwork.

[15] (5) Find the following Limits. Justify your answers by clearly showing steps.

a) $\lim_{x \to -\infty} \dfrac{3x^2 - x - 1}{4x^2 + 7}$

b) $\lim_{x \to \infty} \dfrac{\sqrt{1 + 4x^2}}{4 + x}$

c) $\lim_{x \to \infty} \left(\sqrt{x^2 + 3x + 1} - x \right)$

[12] (6) Let $f(x) = x^3 - 3x + 1$

a) Find all critical numbers for f

b) Determine intervals of increase and decrease

c) Determine intervals of Concavity

137 (7) Given a "mystery" function $y = f(x)$
Sketch its graph based on the following information. Be sure to Label all intercepts, asymptotes, Local Extrema, and/or Inflection points.

A) Domain $= \mathbb{R} = (-\infty, \infty)$

B) y int $\quad f(0) = 0$
x int $\quad f(x) = 0 \Rightarrow x = 0$

C) $f(-x) = -f(x)$

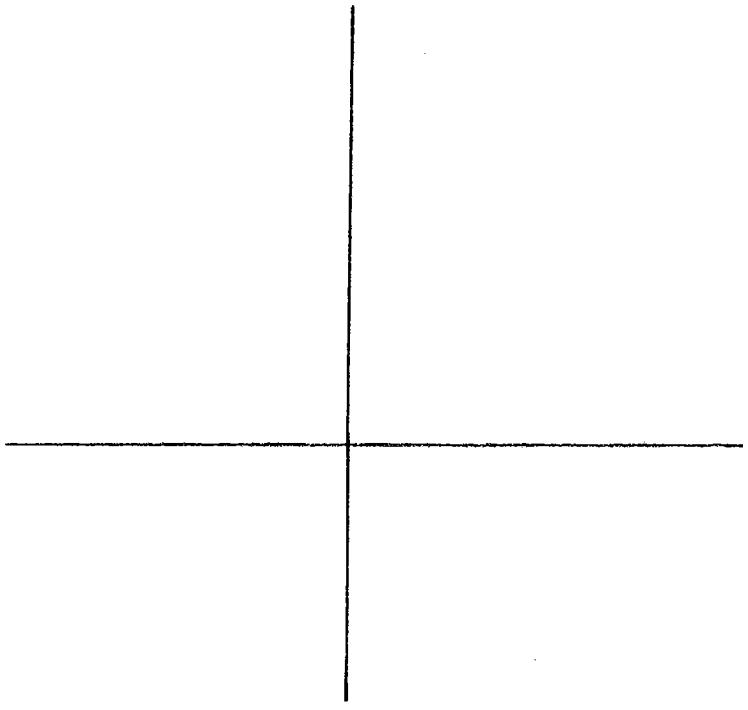
D) $\lim_{x \to \infty} f(x) = 1$
$\lim_{x \to -\infty} f(x) = -1$

E) & F)

	f'
$(-\infty, \infty)$	+

G)

	f''
$(-\infty, 0)$	+
$(0, \infty)$	−



[10] (8) Find the point on the line $y = 2x - 3$ that is closest to the origin. Show work for credit.

(9) a) State Rolle's Theorem

b) State the Mean Value Theorem

c) Use the Intermediate Value Theorem to show that $f(x) = x^5 + 10x - 3$ has a real # root on $[0, 1]$.

(9) d) Use either Rolle's Theorem (or if you prefer the Mean Value Theorem) to show that f has only one real root.

Hint: Suppose f has two roots a and b with $a < b$. Apply Rolle's Theorem to f and reach a contradiction. Be sure to explain why all the hypotheses of the theorem are valid.

BONUS Use Rolle's Thm to Prove the Mean Value Theorem