3.1-3.4 Help Session

1. Find all critical numbers for $h(x) = 2x^{5/3} - x^{2/3} + 3$

2. Find the **value(s)** of the absolute extrema of the function $f(x) = x^3 - \frac{9}{2}x^2 - 12x + 1$ on the interval [-2, 3].

   max = _______________

   min = _______________

   Include theorem and condition.

3. If $f(x) = \frac{x^2}{8x-15}$ on [3, 5], determine if Rolle's Theorem can be applied. If yes, find the value(s) of c defined on Rolle's Theorem.

4. If $g(x) = x^3 - x^2 - 2x$ on [-1, 1]. Determine if the Mean Value Theorem can be applied. If yes, find the value(s) of c defined in the Mean Value Theorem.

7) Suppose $f(4) = 12, f'(4) = 0,$ and $f''(4) = -23$. If $f'(x)$ is never equal to 0 or undefined for any other values of x, use the Second Derivative Test to state all relative extrema for $f(x)$.

7b) Given that $f(x) = \frac{1}{3}x^3 + \frac{5}{2}x^2 + 6x - 1$ If $f'(x)$ is never equal to 0 or undefined for any other values of x, use the Second Derivative Test to state all relative extrema for $f(x)$.

8. Sketch a labeled graph of a function, f, with the following characteristics:

$f(-6) = -6$, $f(-2) = -3$, $f(2) = 5$, $f(5) = -1$
$f'(x) < 0$ if $x < -6$, $x > 2$
$f'(x)$ is continuous for all x
$f'(x) > 0$ if $-6 < x < 2$
$f''(x) < 0$ if $-2 < x < 5$
$f''(x) > 0$ if $x < -2$ and $x > 5$

9. Clearly and fully explain what it <u>means in terms of the graph of a function</u> for intervals where $\frac{dy}{dx}$ is negative and $\frac{d^2y}{dx^2}$ is negative at the same time. (sketch a portion of graph demonstrating these properties)