M 408C
October 4, 2010

1. State the Mean Value Theorem.

2. Determine if the Mean Value Theorem applies to the following functions on the interval $[2, 3]$:

   (a) $f(x) = \cos(2\pi x)$

   (b) $f(x) = \dfrac{x-2}{x-3}$

   (c) $f(x) = \sqrt{x-2}$

   (d) $f(x) = \sqrt[3]{x-e}$

3. If the MVT could be applied in #1, find the point that satisfies the conclusion of the theorem.

4. Use the first and second derivatives to sketch a graph of $f(x) = x^3 + 3x^2 + 3x + 1$.

5. Sketch $g(x) = \dfrac{4x^2 - 5x + 1}{4 - 9x^2}$.

6. Show that if $f'(x) = 0$ for all $x \in [a, b]$ then $f(x) = c$ on $[a, b]$, where c is a constant (Hint: Use the MVT).