§4.2: MEAN VALUE THEOREM

1.] Verify that $f(x) = x^3 - x^2 - 6x + 2$ satisfies the hypothesis of Rolle's theorem for the interval $[0, 3]$ and then find all c that satisfy the conclusion.

2.] Let $f(x) = \dfrac{3}{(x-1)^2}$. Show that $f(0) = f(2)$ but that there is no value $c \in (0, 2)$ such that $f'(c) = 0$. Why does this not contradict Rolle's theorem?

3.] Verify that $f(x) = x^3 - 3x + 2$ satisfies the hypotheses of the Mean Value Theorem on $[-2, 2]$ and then find all c that satisfy the conclusion.

4.] Determine if the function $f(x) = \dfrac{x+1}{2x-5}$ satisfies the hypothesis of the Mean Value Theorem on the interval $[-1, 2]$. If it does, find all values of c that satisfy the conclusion of the theorem.

5.] Law enforcement has been known to issue speeding tickets to drivers who pass between successive EZ pass booths in too short of a time interval. Assume EZ pass booths A and B are 100 miles apart. Use the mean value theorem to demonstrate that a driver who passes booth A at 1 PM and booth B at 2 PM was necessarily speeding at some time between the two booths. What assumptions are you making about the driver's position function?