

§4.6: 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 $f(x) = \tan(x)$. Show that $f(0) = f(\pi)$ but that there is no value $c \in (0, \pi)$ 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.

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- 4.] Use the Mean Value Theorem to show there is some value $c \in (0, 2)$ at which the tangent line to the function $f(x) = x^2 - 2$ has slope 2. Use $f'(x)$ to find this value of c algebraically.
- 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?