Section 3.2

Rolle's Theorem: Let f be continuous on the closed interval $[a, b]$ and differentiable on the open interval (a, b). If $f(a) = f(b)$, then there is at least one number c in (a, b) such that $f'(c) = 0$.

1) Find the two x-intercepts of $f(x) = x^2 - 8x + 15$ and show that $f'(x) = 0$ at some point between the two x-intercepts.

2) Let $f(x) = x^4 - 4x^3 - 2x^2 + 12x$. Find all values of c in the interval $(-2, 4)$ such that $f'(c) = 0$.

The Mean Value Theorem: If f is continuous on the closed interval $[a, b]$ and differentiable on the open interval (a, b), then there exists a number c in (a, b) such that

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

3) Given $f(x) = 2 + \frac{4}{x^2}$, find all values of c in the open interval $(1, 2)$ such that

$$f'(c) = \frac{f(2) - f(1)}{2 - 1}$$

4) You are driving down a highway with a speed limit of 60 miles per hour and when you pass mile marker 10 you notice that you are going 60 miles per hour. Ten minutes later, you pass mile marker 23 and notice that your speed is again 60 miles per hour. You don't remember speeding, but after the officer pulls you over he says he clocked you at 70 miles per hour. Use the mean value theorem to show that the officer must be correct.

Homework for this section: Read the section and watch the videos/tutorials. Then do these problems in preparation for the quiz: #2, 10, 15, 18, 39, 42