

**Section 4.2: The Mean Value Theorem**

(1) In this section, we see Rolle's Theorem and the Mean Value Theorem. What does each theorem say? What is the connection between the two theorems?

(2) In order for the Mean Value Theorem to hold, you need a function which is continuous on  $[a, b]$  and differentiable on  $(a, b)$ . Give examples for each of the following situations. (Sketch a graph of such a function and explain why it fits the situation.)

(a) A function which is not continuous on  $[a, b]$  but is differentiable on  $(a, b)$  where the conclusion of the MVT holds.

(b) A function which is not continuous on  $[a, b]$  but is differentiable on  $(a, b)$  where the conclusion of the MVT does not hold.

(c) A function which is continuous on  $[a, b]$  but is not differentiable on  $(a, b)$  where the conclusion of the MVT holds.

(d) A function which is continuous on  $[a, b]$  but is not differentiable on  $(a, b)$  where the conclusion of the MVT does not hold.

(3) Explain how we can use the Mean Value Theorem to prove that if the derivative of a function is 0 then that function must be constant.

(4) Explain how the Mean Value Theorem can be used in issuing speeding tickets

(5) Compare and contrast the Mean Value Theorem and the Intermediate Value Theorem.

Extra Practice in Book: 4.2: 3, 4, 7, 11, 17, 25, 27, 36,