

## The Mean Value Theorem (4.2)

### Expected Skills.

At the end of this section, students should be able to:

- explain in words the Mean Value Theorem as well as its corollaries,
- explain the importance of the Mean Value Theorem,
- use the Mean Value Theorem to prove properties of a function based on information about its derivative.

**Pre-Class Activity** (ch4-applications-3-mvt-1-pc). The goal of the pre-class activity is to have the students think about and “discover” Rolle’s Theorem. They are in particular asked to think about the conditions necessary for the conclusion of the theorem to hold.

**Worksheet** (ch4-applications-3-mvt-2-ws). In the class activity we start by using what has been done in the pre-class activity and state Rolle’s Theorem. We then go on to state the Mean Value Theorem. To this end one could ask the students, “now, what happens if the two end points are not at the same level?”.

Then, we look at a concrete example of how the theorem is used (point-to-point speed cameras).

Afer that we have the students come up with functions satisfying specific properties. The goal here is to have them think about Corollaries 1 and 2 (p. 232).

*Note that one could add in the worksheet questions that are currently in the homework for that section.*

*In addition, note that the last exercise is very similar (but yet different) from the exercises on the pre-class activity for the next section, which is the first derivative test.*

**Supplemental Activity** (ch4-applications-3-mvt-3-sup-theorems). In this activity, the students probe the differences between the hypotheses and conclusions of Rolle’s Theorem, the Mean Value Theorem, and the Extreme Value Theorem. It is suggested that this activity occur after all three theorems have been addressed in class, so that the whole class can be split into three groups to work on a single theorem before presenting their findings back to the class. It is also suggested that instructors leverage student-generated examples for Rolle’s Theorem and ask students to check if hypotheses of the Extreme Value Theorem are held as well, etc.