**Chapter 4**

**Applications of Derivatives**

**4.4 The Mean Value Theorem**

**Section Exercises**

149. Why do you need differentiability to apply the Mean Value Theorem? Find a counterexample.

Answer: One example is 

151. If you have a function with a discontinuity, is it still possible to have  Draw such an example or prove why not.

Answer: Yes, but the Mean Value Theorem still does not apply

**For the following exercises, determine over what intervals (if any) the Mean Value Theorem applies. Justify your answer.’**

153. 

Answer: 

155. 

Answer: 

**For the following exercises, graph the functions on a calculator and draw the secant line that connects the endpoints. Estimate the number of points such that **

157. **[T]**over 

Answer: 2 points

159. **[T]**over 

Answer: 5 points

**For the following exercises, use the Mean Value Theorem and find all points such that **

161. 

Answer: 

163. 

Answer: 

165. 

Answer: 

**For the following exercises, show there is nosuch that  Explain why the Mean Value Theorem does not apply over the interval **

167. 

Answer: Not differentiable

169. 

Answer: Not differentiable

**For the following exercises, determine whether the Mean Value Theorem applies for the functions over the given interval  Justify your answer.’**

171.  over 

Answer: Yes

173.  over 

Answer: The Mean Value Theorem does not apply since the function is discontinuous at 

175.  over 

Answer: Yes

177.  over 

Answer: The Mean Value Theorem does not apply; discontinuous at 

179.  over 

Answer: Yes

181.  over 

Answer: The Mean Value Theorem does not apply; not differentiable at 

**For the following exercises, consider the roots of the equation.**

183. Find the conditions for exactly one root (double root) for the equation 

Answer: 

**For the following exercises, use a calculator to graph the function over the interval  and graph the secant line from  to  Use the calculator to estimate all values of as guaranteed by the Mean Value Theorem. Then, find the exact value of  if possible, or write the final equation and use a calculator to estimate to four digits.**

185. **[T]** over 

Answer:  

187. **[T]** over 

Answer: The Mean Value Theorem does not apply.

189. **[T]** over 

Answer:  

191. Two cars drive from one spotlight to the next, leaving at the same time and arriving at the same time. Is there ever a time when they are going the same speed? Prove or disprove.

Answer: Yes

193. Show that  and have the same derivative. What can you say about 

Answer: It is constant.

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