Part I: Read and Respond (prepare for class Friday, April 25)

Read Section 5.3, taking notes for yourself and answering the following questions to turn in as part of your Part I assignment. Review the syllabus for parts (a)–(c) that should be included in this assignment.

Reading Questions

1. In the proof of Rolle's Theorem, for the case that the max and the min both occur at the endpoints, Abbott says "then f is necessarily a constant function." Explain to a Calculus I student why this must be so.
2. In the proof of the Mean Value Theorem, why are we considering the distance function $d(x)$? Can you give a geometric explanation?
3. On page 160, why does our choice of t imply what is given in (1) for all $x \in (a, t)$?

Part II: Exercises (prepare for class for Friday, April 25)

1. Draw a function $f\colon [a, b] \to \mathbb{R}$ (you do not need to have an explicit formula for your function) or explain why such a function is impossible to draw such that
   (a) $f(a) = f(b)$ but $f'(c) \neq 0$ for any $c \in (a, b)$
   (b) $f(a) = f(b)$ and f is continuous on $[a, b]$ but $f'(c) \neq 0$ for any $c \in (a, b)$.
2. Prove that $2x + 1 - \sin x = 0$ has exactly one solution. You should first prove that there are any solutions at all and then prove that there's only one solution. Hint: the IVT and Rolle's Theorem are your friends for this problem.
3. **True** or **False**: For $f(x) = |x|$ on the interval $[-\frac{1}{2}, 2]$, you can find a point c in $(-\frac{1}{2}, 2)$ such that

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

Part III: Problems

Nothing new; feel free to turn in up to 5 revisions next week if you'd like!