

Homework 9

Math 147 (section 501–502–503), Spring 2015

This homework is due on Wednesday, March 25.

0. Read Sections 4.8 and 5.1. After reading these sections, you should be able to answer the following questions (which are *not* to be turned in).
 - The Extreme-Value Theorem guarantees (under certain hypotheses) the existence of a global maximum at some $x = c$. Does it tell you where in the interval $[a, b]$ the number c is, or how many such c exist? Could there be two? Could there be infinitely many? (Consider a straight line.)
 - What does Rolle's Theorem say? How is it related to the Mean-Value Theorem?
1. (a) Determine $\sin\left(\arccos\frac{3}{5}\right)$. *Hint:* Let $\theta = \arccos\frac{3}{5}$ be one angle of a right triangle.
(b) Determine $\cos\left(\arcsin\frac{3}{5}\right)$.
2. (a) Determine the linear approximation of $f(x) = e^{2x}$ at $x = 0$.
(b) Use your linear approximation to estimate $e^{-0.04}$. Compare with the true value.
3. Section 4.7 # 18
4. Section 4.8 # 18, 32, 38
5. Section 5.1 # 4, 10, 12, 16, 18, 26
6. (These problems are *not* to be turned in!)
 - (a) Section 4.8 #1, 7, 11, 17, 25, 33, 37
 - (b) Section 5.1 # 3, 9, 11, 17, 25

REMINDER: The second exam is on Thursday, March 26, from 7:30pm to 9:30pm, in HELD 113. Please bring pencils and a 15-question scantron form. The topics for the exam are from *Sections 4.2–4.8, plus local/global extrema, Extreme-Value Theorem, and Fermat's Theorem* (from Section 5.1). The following questions may guide your studying for the exam:

- How do I know when to use the product rule? chain rule? implicit differentiation? logarithmic differentiation? the formula for the derivative of an inverse function?
- What steps do I take when doing a related rates problem? doing implicit differentiation? logarithmic differentiation? finding global max/min?
- Can I use the power rule for computing the derivative of x^x ? What about 5^x or x^5 ?
- How can I find the differential equation for a radioactive decay function or an exponential growth function?
- How do I compute acceleration? the instantaneous per-capita growth rate?
- What does the Extreme-Value Theorem say? Fermat's Theorem?