Math 163A A01 Fall 2009 **Guide for Test 3**

Here are some sample questions from Sections 3-5, 3-6, 3-7, 4-1, 4-2, 4-3, 4-4, and 4-5. Some topics that we covered are not represented by these questions, but are still fair game.

1. Differentiate with respect to x. Show your work.
   (a) $4 + 3x - 5x^2 + \frac{1}{x^2} + x^{1/4} + \sqrt{x}$
   (b) $4^x + \log_5(x)$
   (c) $\ln(x^3 + \sqrt{x})$
   (d) $x^e e^x$
   (e) e^{x^2+7x}
   (f) $(\ln(x^3))^4$
   (g) $\ln(e^{x^2+7x})$
   (h) $x^e e^{x^2+7x}$
   (i) $\dfrac{\log_5(x^3 + x^2)}{e^{x^2+7x}}$
2. At 9:52am on Tuesday October 6, 2009, Bob invests \$1000 in Chase Bank at 4%interest. At 10:22am, a train leaves Chicago headed west at 48 miles per hour. How long will it take Bob's money to triple?
3. Consider the function $y = x^2(3 - x)$.
   (a) Find the differential dy.
   (b) Use the differential to approximate the change in y when x changes from 3 to 5.
4. The profit from producing and selling x thousand gizmos is estimated to be $P(x) = -(x - 5)^2 + 10$.
   (a) Find the marginal profit when 2000 are being produced.
   (b) Find the marginal average profit when 2000 are being produced.
5. Find the equation of the tangent line to the curve $x^2 - y = 4e^y$ at the point $(2, 0)$.