

## Math 162 HOMEWORK - Fall 1999

The homework assigned to each lecture is listed below. Some of the problems are listed in the book, other problems are not. These problems are prefaced with an “O” (for other). Whenever an instruction says “graph” it means, use your calculator. When it says “sketch” it means, draw a rough graph by hand.

The answers to the odd book problems are in the back of the book. The answers to all other problems will be posted on the web.

The homework is assigned up to Exam 2. The set of homework for the second half of the semester will be handed out at that time.

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- 1 Aug 23 : **O1.** Sketch (by hand) the graphs of (a)  $y = 5x - 3$ , (b)  $y = 3x^2 - 1$ , (c)  $y = -2(x - 2)^2 + 4$ , (d)  $y = 2x^2 - 2x + 1$  (complete the square). **O2.** (a) Estimate the slope of the tangent line to  $y = x^2$  at  $x_0 = 2$ . (b) Find an equation to the tangent line using the estimated slope. (c) Graph the function and the tangent line that you found. Check (by eye) that your slope is approximately correct. **O3.** Repeat Pb O2 for  $y = \sin(x)$  and  $x_0 = \pi/3$ . **O4.** Repeat Pb O2 for  $y = 1/x$  and  $x_0 = 2$ .  
**§1.6:** 1, 2.
- 2 Aug 25 : **§1.1:** 29, 32, 35, 36, 37, 38, 39, **O1.** An object is dropped from the top of a 100-m-high tower. Its height above ground after  $t$  seconds is  $h(t) = 100 - 4.9t^2$ . Estimate its velocity 2 seconds after it is dropped. **O2.** The number of fruit flies in a 50-day experiment are counted to be as follows. Day 1: 10. Day 10: 20. Day 15: 48, Day 20: 100, Day 25: 180, Day 30: 260, Day 35: 305, Day 40: 330, Day 45: 345, Day 50: 350. Estimate the population growth rate (a) on day 20. (b) on day 40. (c) Sketch a graph of the number of flies as a function of time.
- 3 Aug 27 : **§1.1:** 1, 2, 3, 4, 5, 6, 11 (add (d) what is  $f(-3)$ ?), 17, 19, 21, **§1.2:** 2, 7, 9, 15, 19, 23, 24, 27, 29, **O1.** Evaluate  $\lim_{x \rightarrow -2} \frac{x+2}{x-2}$ .
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- 4 Aug 30 : **§1.4:** 1, 4, 7, 9, 15 (does the limits as  $h \rightarrow 0$  exist?), 17 (does the limits as  $x \rightarrow 1$  exist?), 21 (does the limit as  $x \rightarrow 0$  exist?), 24, 28, 29, 39, 41.
- 5 Sep 1 : **§1.5:** 1, 3, 6-9 (be able to do this without looking at the graph), 13, 14, 20, 36, 37, 39, 46, 47, 63. **O1.** Is the function in Pb1, page 104, continuous at  $x = 0$ ?  $x = 1$ ?  $x = -1$ ? Why or why not?
- 6 Sep 3 : **§2.1:** 1, **O1.** (a) Using the definition, find the derivative of  $y = 1/x$ . (b) Find an equation for the tangent line at  $x_0 = 2$ . (c) Graph both the function and its tangent line. **O2.** Repeat Pb O1 for  $y = \sqrt{x+1}$ . **O3.** Repeat Pb O1 for  $y = 2x^3$ . **O4.** Repeat Pb O1 for  $y = \frac{1}{x-1}$ . **O5.** Show that the function  $f(x) = x^{1/3}$  has a vertical tangent at the origin. (Use the definition to evaluate the derivative at  $x = 0$ ). **O8.** Use the definition of the derivative to show that the function  $y = |x|$  is not differentiable at the origin.  
**§2.1:** 35, 36, 41, 42, 43.
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- 7 Sep 8 : **§2.2:** 1, 5, 11, 13, 15, 17, 20, 22, 23, 24, 32, 39, **§2.6:** 1, 3, 4, 11
- 8 Sep 10 : **§2.1:** 27-30, 31, 33, 34, **§2.2:** 41, 42, 45, 47a, **§3.4:** 63, 64, 65, **p183:** 89.
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- 9 Sep 13 : **§2.3:** 1, 7, 10, 16, 17, 18, 19, 20, 22, 27, 28, **p183:** 93, 94.
- 10 Sep 15 : **§2.4:** 1, 2, 3, 5, 6, 8, 13, 17, 34, 35, 38, 39, 46, 56, 57, 59, 61.

- 11 Sep 17 : §2.5: 9, 13, 15, 17, 20, 22, 27, 29, 31, 33, 59.
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- 12 Sep 20 : §2.6: 19, 20, 23, 27, 47, 49, 59.  
 13 Sep 22 : §2.7: 3, 10, 12, 13, 14, 15, 17, 22.  
 14 Sep 24 : no homework due
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- 15 Sep 27 : no homework due  
 16 Sep 29 : §3.1: 1, 3, 5, 6, 7, 9, 11, 13, 23, 27 (please use what you know about parabolas), §3.3: 37a, 38a.  
 17 Oct 1 : §3.3: 9, 11, 12, 15, 17, 18, 21, 23, 34, 41.
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- 18 Oct 4 : §3.4: 1, 2, 3, 5, 13, 17, 23, 35, 79, 80.  
 19 Oct 6 : §3.5: 12, 14, 25, 26, 31, O1. Find the dominant behaviour of  $y$  as  $x \rightarrow \pm\infty$  for (a)  $y = \frac{x+1}{x}$ , (b)  $y = \frac{x^4+1}{x^3}$ , (c)  $y = \frac{x^4}{x^3+1}$ , §3.5: 45, 47, 49, 59, 61, 67, 71.  
 20 Oct 8 : §3.6: 2, 4, 7, 11, 19.
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- 21 Oct 11 : §3.6: 27, 29, 30, 33, 34.  
 22 Oct 13 : In the following 5 problems, also graph both the function and its linear approximation. §3.7: 1, 2, 3, 5, 6. In the following 3 problems, also use the linearization to approximate  $f(x_0)$  and compare to the value your calculator gives. §3.7: 7, 8, 11. O1. Show that the approximation  $f(x) = (1+x)^k \approx 1+kx$  holds near  $x=0$ , for all values of  $k$ . O2. Use the previous result to find the linear approximations near the origin of (a)  $y = (1+x)^2$  (b)  $y = 1/(1+x)^5$  (c)  $y = 1/\sqrt{1+x}$  (d)  $y = (1-x)^2$  (Hint: replace  $x$  by  $-x$  in (a)) (e)  $y = (1+5x)^2$  (Hint: see previous hint) (f)  $y = 1/\sqrt{1-3x}$  (Hint: remember (c)). §3.7: 18.
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- 23 Oct 18 : §3.7: 43 (replace  $dr$  by  $\Delta r$ ), 45, 47, 49, 52, p271: 79, 80.  
 24 Oct 20 : (no homework due)  
 25 Oct 22 : (no homework due)