Calculus 150 Homework Assignments

Fall 1998

There are 14 homework sets. Each homework set is divided into two parts. Part 1 consists of about 50 routine problems from the text. Part 2 consists of a few challanging problems. Part 1 is worth 7 points, while Part 2 is worth 3 points. You should do all of Part 1 and as much of Part 2 as you can. Solutions to some Part 2 problems will be posted on the wall next to my office (Neckers 465) and on the webpage: `http://nkrs465.math.siu.edu/~mike/150/`

Homework is due the first class day of each week. Late homework is half off for each calender day late. All assignments are subject to change, so come to class!

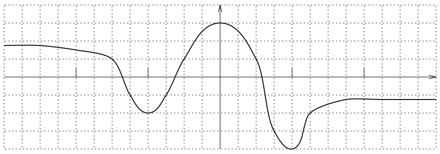
Homework Set 1. Due Tues., September 1

Part 1: 0.1: 1, 5, 9, 13, 15, 25, 31, 35; **0.2:** 13, 12, 15, 16, 17, 23, 25, 35, 40, 41, 45, 49, 50, 52, 57; **0.3:** 11, 27, 36, 37, 49, 53; **0.4:** 1, 5, 15, 17, 20, 22 (find the exact domain and range!), 59, 60

Part 2: 0.1: 42, 57 (use coordinates).

A: Let $f(x)$ be defined by the graph below. Graph each of the following:

1. $y = -f(x)$,
2. $y = |f(x)|$,
3. $y = -f(|x|)$,
4. $y = -f(-x)$,
5. $y = 1/f(x)$.



Homework Set 2. Due Mon., September 7

Part 1: 0.5: 5, 7, 13, 14, 15, 17-22, 31, 33, 35, 39, 44, 45, 48, 49, 50; **0.6:** 1, 4, 8, 9, 15, 17, 21, 37, 39, 49, 51, 57, 59, 65, 71, 73, 75; **0.7:** 1, 3, 7, 10, 13, 19, 22, 23, 26, 35, 37;

Part 2: 0.3: 76 (use coordinates)

A: Let $f(x)$ be an odd function. Assuming the function is defined at zero, what can you say about $f(0)$? Prove your claims. Hint: Study $f(-0)$.

B: Derive the properties of logarthms listed on page 63.

Homework Set 3. Due Mon., September 14

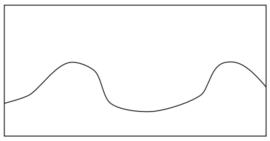
Part 1: 0.2: 61, 62, 63; **0.5:** 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71; **0.7:** 42, 45, 47, 54, 56, 63, 66; **1.2:** 1, 3, 5, 7, 9, 11, 13, 15 17, 41; **2.1:** 5, 10, 11, 15, 17, 20, 21, 27, 28, 29, 30, 31, 32; **1.3:** 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27

Part 2: 0.6: 98, 100

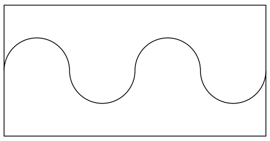
A: Find a function defined on the whole real line such that it is one-to-one, yet is increasing on one part of its domain and decreasing on another part of its domain.

B: Graph the derivatives of the functions below.

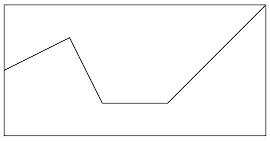
a



b



c



Homework Set 4: Due Mon., September 21

Part 1: 1.2: 24, 28; **1.4:** 5, 6, 7, 8, 9, 11, 14, 16, 25, 27, 29, 37, 51, 54; **1.5:** 8, 13, 16, 27, 28, 32, 34, 43, 49, 50; **2.2:** 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 35, 40, 42, 48, 49, 51, 52, 53, 58, 71; **2.3:** 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21

Part 2: 2.1: 55, 59, 65 (use the definition of a derivative)

A: Let $e = \lim_{x\to 0}(1+x)^{1/x}$.

i) Estimate the value of e to 5 decimal places.

ii) Let q be a number. What is $\lim_{x\to 0}(1+x)^{1/qx}$?

iii) Let p be a nonzero number. What is $\lim_{x\to 0}(1+px)^{1/x}$?

iv) What is $\lim_{x \to 0} (1 + px)^{1/qx}$?

Homework Set 5: Due Mon., September 28

Part 1: 2.3: 20, 22, 24, 26, 28, 30, 32, 34 ,36, 38, 40; **2.4:** 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73; **2.5:** 1, 3, 7, 8, 10, 20, 23, 25, 28, 51, 52; **2.6:** 1, 3, 5, 7, 21, 25, 30, 45; **Ch 2 Review:** 49, 51, 73, 77, 79

Part 2: 2.3: 97; **2.5:** 62

A: Let $f(x)$ be an invertible function with inverse $f^{-1}(x)$. Show that if f is increasing then so is f^{-1}.

Homework Set 6: Due Mon., October 5

Part 1: 2.5: 2, 4, 22, 26, 29, 31, 33; **3.1:** 7, 9, 11, 16, 17, 21, 23, 35; **3.2:** 39, 40, 41, 44; **3.3:** 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31; **3.4:** 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 51, 53, 55, 56, 57, 58

Part 2: 2.2: 99; **2.3:** 90; **2.4:** 105, 110 (use the definition of a derivative); **2.6:** 34, 35, 38

Homework Set 7: Due Mon., October 12

Part 1: 3.5: 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 39, 40, 43, 48; **1.6:** 6, 7, 10, 11, 15, 17, 29, 33, 39; **3.6:** 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 57, 58, 59, 60, 68; **3.7:** 3, 5, 11, 15, 21, 23, 29, 45, 49, 52

Part 2: 3.2: 55, 57; **3.4:** 52, 54, 60

Homework Set 8: Due Mon., October 19

Part 1: 1.3: 6, 8, 10, 12, 14, 16; **1.4:** 10, 12, 14, 16; **Ch 2 Review:** 21, 23, 25, 27, 29, 31; **3.8:** 1, 3, 5, 7, 23, 25, 28, 31; **3.9:** 39, 40, 41, 42, 53; **4.1:** 1-33 (odd), 47, 48, 49, 50; **4.2:** 1-19 (odd), 41, 43, 45, 47

Part 2: 3.7: 37, 38, 46; **Ch2 Review:** 83, 84; **4.1:** 54

Homework Set 9: Due Mon., October 26

Part 1: 2.4: 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28; **4.1:** 53, 55, 57, 59; **4.3:** 2, 4, 6, 8, 10, 12, 14, 16, 18, 20; **4.4:** 1-31 (odd), 36-43 (even)

Part 2: 3.2: 56; **3.3:** 56, 63; **4.2:** 64; **Ch 2 Review:** 94

Homework Set 10: Due Mon., November 2

Part 1: 0.7: 2, 6, 21, 24, 25, 38, 60, 62, 68, 69; **1.4:** 26, 28, 30, 32, 34; **Ch 2 Review:** 6, 8, 10, 12, 14; **Ch 3 Review:** 17-37 (odd); **4.3:** 1-19 (odd); **4.4:** 2-32 (even), 35-43 (odd), 63-79 (odd); **4.5:** 1-19 (odd), 36-46 (even), 53, 55, 57, 59

Part 2: Ch 4 Review: 24, 25, 26

Homework Set 11: Due Mon., November 10

Part 1: 2.5: 32, 34; **3.8:** 29, 44; **4.5:** 2-20 (even), 35-51 (odd), 54, 56, 58, 60; **4.6:** 2-20 (even); **4.7:** 3-21 (odd); **Ch 4 Review:** 4-20 (even), 33-45 (odd)

Part 2: 0.6: 96, 102; **4.1:** 60; **4.2:** 30, 64; **4.4:** 53

Homework Set 12: Due Mon., November 16

Part 1: 3.6: 16, 18, 22; **3.7:** 16; **4.1:** 2,4, 6, 8, 10, 12, 14, 16, 18, 20; **4.5:** 90, 91, 92; **5.1:** 1-49 (odd), 57, 61; **5.2:** 1, 2, 3, 4, 9, 11, 13, 15, 17, 19, 25, 27, 29, 31, 33, 35, 37, 39, 60, 61, 21

Part 2: 5.3: 41, 51, 52, 54; **4.1:** 56, 58

Homework Set 13: Due Mon., November 30

Part 1: 5.3: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 20, 21, 22, 27, 28, 29; **6.1:** 1, 2, 3, 4, 5, 6, 13, 16, 17, 26, 30, 36, 37, 39; **6.2:** 2, 4, 6, 8, 10, 12, 13, 15, 17, 19, 21, 23, 25, 27, 29, 35a; **6.3:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 19, 21, 23; **6.4:** 3, 5, 7, 9, 11, 13, 27, 29, 30, 32, 34

Part 2: 6.2: 51, 54; **6.3:** 29, 30; **6.4:** 44, 45, 46

Homework Set 14: Due Mon., December 7

Part 1: Ch 1 Review: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 31, 40; **Ch 2 Review:** 5, 7, 9, 11, 13, 15, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 95; **Ch 3 Review:** 5,6,7,8,9, 10, 18, 20, 22, 24,26, 28, 30, 32, 34, 36, 38, 63, 64, 65, 66, 67, 68; **Ch 4 Review:** 21, 22, 23, 24, 25, 26, 27, 34, 36, 38, 40, 42, 44, 46, 53, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78 79, 80; **5.1:** 2, 6, 10, 14, 16, 20, 24, 28, 32, 36, 40, 44, 48, 62, 63, 69; **5.2:** 63, 64, 65

Part 2: None, Part 1 is 10 points.