Math 425a, Fall 2009

Homework Assignments

Students should do all of the assigned homework. I will not collect all of the homework. The due date for the individual and group HW problems will be posted on this website.

Use the attached cover sheet to submit group homework.

Chapter 2

Section 2.1
Pages 32-35: 1, 3, 4, 6, 8, 10, 13, 14, 15: Group HW: 17, 18
Additional Group Problems

1. Let A & B be non-empty, countable sets. Prove that A x B is a countable set.
2. Let n be a natural number. Prove that $A^n=\{(a_1, a_2, \dots , a_n): a_i \varepsilon A\}$ is countable.
3. $A^{\infty} = \{(a_1, a_2, \dots , a_n, \dots): a_i \varepsilon A\}$. The set, A^{∞}, can be viewed as the set of all sequences with entries in the set A.
    a. If A has only one element then A^{∞} has how many elements?
    b. If A has at least two elements, then is A^{∞} countable or uncountable?

INDV: 3, 6, 8, 10, 14: **Due 9/4**
GP: **Due 9/4**

Section 2.2
Page 37: 1, 2, 3, 4, 5**:**
Group problems

1. Let A be an infinite countable set. Then there is a natural 1-1 correspondence between the set of all subsets of A and $\{0,1\}^{\infty}$. This implies that the set of all subsets of A and $\{0,1\}^{\infty}$ have the same cardinality. What is this correspondence?
2. Let A be an infinite countable set. Prove that the set of all subsets of A has the same cardinality as the reals.

INDV: **Due 9/16**: 1,5
GP: **Due 9/11:** Group problems 1 & 2

Section 2.3
Pages 42-43: 2,3,4,8: Group: 1,9
Group Problems
Let D be a non-empty subset of R and define d to be, d = inf {|x-y|: where,
x,y are elements of D and x is different from y}.
1. Give an example of a set D where d = 0.
2. Suppose d > 0. Show that D is closed.
3. Suppose d > 0 and D is bounded. Show that D is a finite set.

INDV: **Due 9/23:** 4,8
GP: **Due 9/25:** 9 + the three group problems concerning the set D.

Section 2.4
Pages 46-47: 7, 8, 10, 12: Group: 1, 2, 11
INDV: **Due 9/28:** 8, 10, 12
GP: **Due 9/25:** 11

Section 2.5
Pages 52: 7,8: Group: 1,2, 3, 4, 10

INDV: **Due 9/30:** 7,8
GP: **Due 10/2:** 4,10

Exam #1: Wednesday, October 7

Chapter 3

Pages 57-58: 5,6,9,13: Group: 1,7,8,11,14
INDV: **Due 10/5**: 6,13
Group: **Due 10/9** : 8, 11, 14

Pages 61,62: 5,7: Group:1
INDV: **Due 10/9**: 5,7

Pages 65-66: 3,4,5, 7,9: Group: 1,10
INDV: **Due 10/12**: 4,7,9
GP: **Due 10/16**: 10

Page 69: 3,5,8,10,11: Group: 1,6,7,9
INDV: **Due 10/14**: 5,8,10
GP: Due **10/16**: 7,9

Pages 73-74: 3,5, 6: Group: 8,9
INDV: Due **10/14**: 5,6
GP: Due **10/16**: 9

Pages 80-81: 5,6,8: Group: 1,2,3,13,14
INDV: **Due 10/19**: 6,8
GP: **Due 10/23**: 13,14

Pages 85-86: 5,6,9,11,12: Group: 1,2,3,4,8
INDV: **Due 10/19**: 9,11,12
GP: **Due 10/23**: 4,8

Chapter 4

Pages 93-96: 4a,c, 5, 9, 15: Group: 8, 11, 18
INDV: **Due 10/26**: 4a,c, 5, 15
GP: **Due 10/30**: 8,18

Pages 100-101: 2, 6, 7, 8: Group: 4, 9
INDV: **Due 10/30**: 7,8
GP: Due **10/30**: 9

Pages 108-109: 3, 5, 9, 11, 12, 17, 20: Group: 7, 15, 21
INDV: **Due 11/2**: 11, 12, 17, 20
GP: **Due 11/6**: 7, 15, 21

Pages 112--113:1, 4, 8: Group: 2, 5, 7
INDV: **Due 11/4**: 4, 8
GP: **Due 11/6**: 2, 7

Chapter 6

Pages 141-142: 2,3,5 : Group:1,6
INDV: Due 11/9: 3,5
GP: Due 11/13: 6

Pages 149-150: 4,11 : Group: 6,12
INDV: Due 11/13: 11
GP: Due 11/13: 6,12

Pages 154-155: Group: 2,6
GP: Due 11/13: 2

Pages 159-160: 1,2,3 : Group: 6,9
INDV: Due 11/16: 3
GP: Due 11/20: 6

Pages 164-165: 2: Group: 5,6
INDV: Due 11/16: 2
GP: Due 11/20: 5

Pages 172-175: 1,2,5 : Group: 3,4,8
INDV: Due 11/18: 2, 5
GP: Due 11/20: 4,8

Exam #2, November 20

Chapter 8

Page 202: 1,2,3: Group: 4,6
INDV: Due 11/30: 3
GP: Due 12/4: 4

Pages 207-209: 2,3,10,11: Group: 8,12
INDV: Due 12/2: 10,11
GP: Due 12/4: 12

Pages 211-212:1,2,5: Group: 4
INDV: Due 12/4: 5
GP: Due 12/4: 4

Pages 220-221: 4,8
INDV: Due 12/7: 4,8

Page 222: Group: 2,3
GP: Due 12/9: 2,3

Pages 226-227: 4,5: Group: 8
INDV: Due 12/9: 4,5
GP: Due 12/9: 8

Brooke Rabe's write ups

1. **Constructing a bijection.**
2. Solution to Problem #12, Page 47
3. An infinite subset S of R has a countable, dense subset