MATH 510 Discrete Math (Spring 2005) (15440)
Zongzhu Lin
MWF, 12:30pm-1:20pm, CW 131

ATTENDING CLASSES: It should be clear that it is the students' responsibility to attend the classes at the scheduled time and place to get all announcements and handouts (including homework assignments with due dates), to take the exams, to hand in or take back your homework, and, of course, to listen to the lecture. The returning homework will be brought to class at most three consecutive class meetings and then will be sent to recycling services unless you have made prior arrangements with the instructor. If you have any concerns or special needs, please let me know as early as possible. Let me remind you that it is your responsibility to observe all deadlines for adding to or dropping from classes and to know the final exam time and room scheduled by the university.

EXAMS: There will be two 50-minute in-class exams in addition to a comprehensive 110-minute final exam and their schedules are listed below. The exam scores will be given on a percentage basis.

Exam 1: Wednesday, February, 16, 2005, in class.
Exam 2: Monday, April, 11, 2005, in class.
Final Exam: Monday, May, 9, 2005 4:10pm-6:00pm

HOMEWORK: There will be two sets of problems (called HW and PRAC) assigned about every three lectures (about twelve in total). HW are homework problems, which students are required to do carefully and will be graded. PRAC are practice problems and many exam problems will be based on them. The homework grades will be taken into your final course grade. Warning: No joint homework or project will be accepted unless you are told to do so. Although you are strongly encouraged to form study groups and to discuss anything you want, but make sure that no one copies anything from others.

"CHEAT SHEET": About two week prior to the final exam, a special piece of paper will be distributed to every student in class. Students can write any useful information and bring it to the final exam to help them. The size is not large enough and special organization of the materials will be necessary. Students who missed or missed this piece of paper will have to take the final exam without a cheating sheet. No substitute will be allowed.

COURSE GRADE: Your course grade is calculated from the overall course score (%) by the following rules. A: 89-100, B: 77-88, C: 63-76, D: 50-62 and F: below 50. In principle, grades of any exams o homework will not be curved or converted to letter grades. The overall score is calculated by

\[
\text{Overall} = \text{HW} \times 20\% + \text{EX1} \times 20\% + \text{EX2} \times 20\% + \text{FEx} \times 40\%
\]

REMARKS: (1) There will be no makeup exams to be given or late homework to be accepted unless you have the permission from the instructor before the due time or you have an emergency, such as illness, in such a case, doctor's proof (clearly indicating that it is an emergency) is necessary. However, the HW will be the average after dropping two of the lowest (%) grades (missing homework will be treated as 0).
(2) In your solutions to problems of exams or homework, you have to show your work and write them clearly (literally) for the grader to understand. The grader will not guess unless you write clearly. All grades will be given based on your presentation on the paper (no oral explanation afterwards will be counted).

Office Hours: MWF 1:30pm--2:20pm or by appointment.
Office Location: Cardwell Hall 210. Tel.: 532-0573
Course Webpage: http://www.math.ksu.edu/~zlin/m510


Ch 2. The Pigeonhole Principle------3 Lectures
2.1. Pigeonhole Principle: the simple form
2.2. Pigeonhole Principle: The strong form.
2.3. A Theorem of Ramsey
Ch 3. Permutations and Combinations------5 Lectures
3.1. Two Basic counting Principles
3.2. Permutations of sets
3.3. Combinations of sets
3.4. Permutations of multisets
3.5. Combinations of multisets
Ch 5. The Binomial Coefficients--------5 Lectures
5.1. Pascal's formula
5.2. The binomial theorem
5.3. Identities
5.5. The multinomial Theorem
5.6. Newton's binomial theorem
EX I: and Review ------ 2 classes
Ch 6. The Inclusion-Exclusion Principle---5 Lectures
6.1. The inclusion-exclusion principle
6.2. Combinations with repetition
6.3. Derangements
6.4. Permutations with forbidden positions
6.5. Another forbidden position problem
Ch 7 -Recurrence Relations and Generating Functions---4 Lectures
7.1. Some number sequences
7.2. Linear homogeneous recurrence relations
7.3. Generating Functions,
7.5. Recurrences and generating functions
Ch 9. Matchings in Bipartite Graphs--------6 Lectures
9.1. General problem formulation
9.2. Matchings
9.3. System s of distinct representatives
9.4. Stabed marriages
Ch 11. Introduction to Graph Theory------5 Lectures
11.1. Basic properties
11.2. Eulerian trails
11.3 Hamilton chains and cycles
11.5. Trees
EXII: and Review ------ 2 classes
Ch 12. Digraphs and Networks-------3 Lectures
12.1. Digraphs
12.2. Networks
Ch 13. More on Graph Theory-------4 Lectures
13.1. Plane and planer graphs
13.4. Independence number and clique number
Reciew for the Final: 2-classes
Final Exam: May 9, 4:10pm-6:00pm in Classroom

http://www.math.ksu.edu/~zlin/m510/
### Homework Assignments

Homework is due by 5:00pm on the due day in homework box

<table>
<thead>
<tr>
<th>HW No.</th>
<th>Sections</th>
<th>Homework Problems</th>
<th>Practice Problems (hint)</th>
<th>Due Day</th>
<th>solutions (pdf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>2.4</td>
<td>1, 4, 8, 11, 14</td>
<td>3, 5, 7, 9, 10, 15</td>
<td>F. 1/22</td>
<td>Solution</td>
</tr>
<tr>
<td>#2</td>
<td>2.4</td>
<td>16, 18, 23</td>
<td>17, 19</td>
<td>F. 1/29</td>
<td>solution</td>
</tr>
<tr>
<td></td>
<td>3.6</td>
<td>2.4, 6, 7</td>
<td>1.5, 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#3</td>
<td>3.6*</td>
<td>11(10), 13(12), 14(13), 18(17), 32(25), 37(30), 41(34)</td>
<td>10(9), 12(11), 15(14), 19(18), 30(23), 34(27), 42(35)</td>
<td>F. 2/4</td>
<td>solution</td>
</tr>
<tr>
<td>#4</td>
<td>5.8</td>
<td>3, 5, 12, 16, 22</td>
<td>6, 7, 9, 11, 21</td>
<td>M. 2/14</td>
<td>solution</td>
</tr>
<tr>
<td>#5</td>
<td>6.7</td>
<td>2, 4, 6, 9, 11, 13, 15</td>
<td>1, 3, 5, 8, 10, 12, 14</td>
<td>F. 2/25</td>
<td>solution</td>
</tr>
<tr>
<td>#6</td>
<td>6.7</td>
<td>21, 24(c), 25, 28, 29</td>
<td>20, 24(b), 26, 27, 30</td>
<td>F/3/4</td>
<td>solution</td>
</tr>
<tr>
<td>#7</td>
<td>7.8</td>
<td>12(9), 14(11), 28(23)ac, 30(25)b, 35(30).</td>
<td>16(13), 28(23)bd, 30(25)c, 36(31)</td>
<td>F/3/11</td>
<td>solution</td>
</tr>
<tr>
<td>#8</td>
<td>9.5</td>
<td>2, 3, 6, 8, 11, 13, 15</td>
<td>1, 4, 7, 9, 10, 12, 14, 16</td>
<td>F/3/18</td>
<td>solution</td>
</tr>
<tr>
<td>#9</td>
<td>9.5</td>
<td>20, 22</td>
<td>19, 21, 26</td>
<td>W/4/6</td>
<td>solution</td>
</tr>
<tr>
<td></td>
<td>11.8</td>
<td>2, 5, 9, 12, 14</td>
<td>1, 4, 6, 11, 13, 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#10</td>
<td>11.8</td>
<td>18, 26, 30, 41, 44, 51(b), 62</td>
<td>19, 27, 29, 31, 47, 51(c), 64</td>
<td>M/4/25</td>
<td>solution</td>
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<tr>
<td>#11</td>
<td>11.8</td>
<td>64, 68, 70</td>
<td>66, 69, 4,.5</td>
<td>W/5/4</td>
<td>solution</td>
</tr>
<tr>
<td></td>
<td>12.3</td>
<td>3, 6, 9</td>
<td>9, 13, 14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Solutions to Exam 1*

* Numbers in () are the corresponding problem numbers in 3rd edition of the book.

**Final Exam Time:** Monday, May 9, 4:10pm-6:00pm in the same classroom.

\[ hws = \text{sum(hw1:hw12)} - \text{small(hw1:hw12,1)} - \text{small(hw1:hw12,2)} / 10 \]

**Overall Score:** \[0.2\times hw + 0.2\times ex1 + 0.2\times ex2 + 0.4\times fe + 0.1\times \max(0; fe-ex1; fe-ex2)\]

**Final Exam is on a 100 pt scale**

Then computer will do the work!

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