<table>
<thead>
<tr>
<th>DEPARTMENT:</th>
<th>Mathematics</th>
</tr>
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<tbody>
<tr>
<td>COURSE:</td>
<td>MA 440</td>
</tr>
<tr>
<td>TITLE:</td>
<td>Data Structures I</td>
</tr>
</tbody>
</table>
| TEXTS:                | Discrete Mathematics and its Applications  
                        | 5th edition             
                        | By Kenneth H. Rosen     
                        | McGraw-Hill             |
| CREDITS:              | 3 (2 class hours, 2 lab hours) |

Fall 2004  

Prepared by  
Prof. L. Chosid  
Prof. A. Taraporevala

A. Testing Guidelines:  
The following exams should be scheduled:  
   i. A one-hour exam at the end of the First Quarter  
   ii. A one-session exam at the end of the Second Quarter  
   iii. A one-hour exam at the end of the Third Quarter  
   iv. A one-session Final Examination

B. A scientific calculator with trigonometric functions is required.
<table>
<thead>
<tr>
<th>Week</th>
<th>Discrete Mathematics</th>
<th>Homework</th>
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| 1    | 1.1 Logic **pages** 1 – 15  
1.2 Propositional Equivalences **pages** 20 – 26  
Introduction to MATLAB | **P. 15:** 2, 3, 5, 7, 10, 17, 21 – 23, 29, 34  
**P. 26:** 3, 4, 6, 7  
Does MATLAB recognize irrational numbers? Why?  
Is the decimal representation a rational number? Is \(1.55555\ldots\) a rational number? Why? |
| 2    | 1.3 Predicates and Quantifiers **pages** 28 – 38  
1.4 Nested Quantifiers **pages** 44 – 51  
MATLAB Logic | **P. 40:** 1, 3, 4, 7 – 13 odd, 19, 28, 34  
**P. 51:** 10, 31, 33, 48 (written assignment) |
| 3    | 1.5 Methods of Proof **pages** 56 – 73  
1.6 Sets **pages** 77 – 85  
1.7 Set Operations **pages** 86 – 94  
MATLAB Sets | **P. 75:** 20, 21, 23, 26, 27  
**P. 85:** 9 (not(d)), 15 (a)& (b), 19, 21, 23, 25  
**P. 95:** 3, 11 (b), 13 (b), 17, 20, 36, 37, 39 (written assignment), 40-43, 45 |
| 4    | **First Examination**  
1.8 Functions **pages** 97 – 108  
MATLAB Floor and ceiling functions | **P. 108:** 3, 8, 10 – 12 all, 15, 17 (written assignment), 19, 20, 23, 25, 31, 34, 35, 50 – 53 all |
| 5    | 2.1 Algorithms **pages** 120 – 125  
MATLAB m-files (maximum, linear search, binary search) | **P. 129:** 1, 3*, 5*, 7*, 11*, 13, 14, 16*, 17*, 18*, 27* |
| 6    | 2.1 Logic **pages** 125 – 129  
MATLAB m-files (bubble sort, insertion sort) | **P. 130:** 34, 35, 36, 37*, 38 – 41 all, 42*, 43*, 47, 48, 50, 52, 53, 57 (written assignment) |
| 7    | 2.4 The Integers and Division **pages** 153 – 166  
2.5 Integers and Algorithms **pages** 169 – 179  
MATLAB m-files (Constructing Base b Expansions, Euclidean Algorithm) | **P. 166:** 11, 18, 29, 32, 37, 39, 48, 49, 50, 52*, 53, 54  
**P. 179:** 1 – 12 all, 19, 21, 30, 31, 43, 49*, 50, 51*, 52 |
| 8    | **Mid-semester Examination**  
3.2 Sequences and Summations **pages** 225 – 236 | **P. 236:** 3, 9, 13*, 14, 15, 17, 19 – 23 all, 27, 31 |
| 9    | 3.3 Mathematical Induction **pages** 238 – 253  
MATLAB | **P. 253:** 1 – 9, 13, 15, 33, 34, 35, 40 |
| 10 | 3.4 Recursive Definitions and Structural Induction pages 256 – 270  
    3.5 Recursive Algorithms pages 274 – 283  
    MATLAB Recursive Algorithms | P. 270: 1, 3, 5, 7, 30, 33 35 all, 43, 44, MATLAB definition of Ackermann’s function, 48*, 51*, 60, 61  
    P. 283: 2*,3*, 4*, 5*, 9*, 10, 21, 22, 29*, 34, 38, 39, 40* |
| 11 | 3.6 Program Correctness pages 284 – 289  
    Third Examination | P. 290: 3, 7 |
| 12 | 8.1 Introduction to Graphs pages 537 – 543  
    8.2 Graph Terminology pages 545 – 554  
    8.4 Connectivity pages 567 – 575 | P. 544: 3 - 9 all, 27  
    P. 554: 41, 43, 47, 51, 52  
    P. 544: 1 – 5 all |
| 13 | 9.1 Introduction to Trees pages 631 – 641  
    9.2 Applications of Trees pages 644 – 656  
    9.3 Tree Transversal pages 660 – 672 | P. 641: 1 – 10 all , 17 – 20 all, 21 (written Assignment), 27, 28, 33, 34, 38 – 41 all  
    P. 656: 1- 7 odd, 11, 19, 21, 22, 37  
    P. 672: 1, 3, 6, 7, 910, 12, 13, 15, 22, 24, |
| 14 | 9.4 Spanning Trees pages 674 – 685  
    9.5 Minimum Spanning Trees pages 688 – 693 (optional) | P. 685: 2 – 6 all, 29, 30, 32  
    P. 15: 1, 2, 3 |
| 15 | Review/ MATLAB Presentation  
    Final Examination |  |