Practice Midterm Questions

Chetan Tonde

July 19, 2012

1 Syllabus

Rosen book - Seventh Edition.
(For sixth edition, please refer to the excel spreadsheet posted online which gives the mapping between the the seventh and sixth edition.)

1. (a) Section 1.1 - Propositional Logic
   (b) Section 1.3 - Propositional Equivalences
   (c) Section 1.4 - Predicates and Quantifiers
   (d) Section 1.5 - Nested Quantifiers
   (e) Section 1.6 - Rules of Inference - **(For this topic refer the tutorial on natural deduction posted online rather than the book)**
   (f) Section 1.7 - Introduction to Proofs
   (g) Section 1.8 - Proof Methods and Strategies

2. (a) Section 2.1 - Sets
   (b) Section 2.2 - Set Operations
   (c) Section 2.3 - Functions
   (d) Section 2.4 - Sequences and Summations

3. (a) Section 5.1 - Mathematical Induction
   (b) Section 5.2 - Strong Induction and Well-Ordering (Strong Induction part only)

2 Preparing for the midterm

1. Read textbook sections as you need them.

2. Go over the quizzes and resolve them.

3. Solve practice questions given below.

4. Go over the homework problems. (This is not really needed.)

This should be more than enough preparation for the exam.

3 Questions - 7th edition

1. (a) Section 1.1 - Exercises - 24, 28.
   (b) Section 1.3 - Exercises - 30, 32.
   (c) Section 1.4 - Exercises - 42.
   (d) Section 1.5 - Exercises - 36, 48
   (e) Section 1.6 - Exercises - 24, Problems 9.6, 9.8 from the tutorial uploaded online.
   (f) Section 1.7 - Exercises - 38, 42.
   (g) Section 1.8 - Exercises - 6, 18.

2. (a) Section 2.1 - Exercises - 10, 26.
   (b) Section 2.2 - Exercises - 4, 36.
   (c) Section 2.3 - Exercises - 10, 14, 26.
   (d) Section 2.4 - Exercises - 10, 26, 34.

3. (a) Section 5.1 - Exercises - 5, 34.
   (b) Section 5.2 - Exercises - 4.

4 Questions - 6th edition

1. (a) Section 1.1 - Exercises - 20, 24.
   (b) Section 1.3 - Exercises - 30, 32.
   (c) Section 1.4 - Exercises - 42.
   (d) Section 1.5 - Exercises - 36, 48
   (e) Section 1.6 - Exercises - 24, Problems 9.6, 9.8 from the tutorial uploaded online.
   (f) Section 1.7 - Exercises - 38, 42.
   (g) Section 1.8 - Exercises - 6, 16.

2. (a) Section 2.1 - Exercises - 8, 26 (The problem is given below).
   (b) Section 2.2 - Exercises - 4, 36.
   (c) Section 2.3 - Exercises - 10, 14, 26 (The problem is given below).
   (d) Section 2.4 - Exercises - 10(Given below), 10, 18.

3. (a) Section 5.1 - Exercises - 5, 34.
   (b) Section 5.2 - Exercises - 4.

4.1 Section 2.1 - 26

Show that if $A \subseteq C$ and $B \subseteq D$ then $A \times B \subseteq C \times D$

4.2 Section 2.3 - 26

a) Prove that a strictly increasing function from R to it- self is one-to-one.
b) Give an example of an increasing function from R to itself that is not one-to-one.

4.3 Section 2.4 - 10

Find the first six terms of the sequence defined by each of these recurrence relations and initial conditions.
a) $a_n = -2a_{n-1}, a_0 = -1$
b) $a_n = a_{n-1} - a_{n-2}, a_0 = 2, a_1 = -1$
c) $a_n = 3a_{n-1}^2, a_0 = 1$
d) $a_n = na_{n-1} + a_{n-2}^2, a_0 = -1, a_1 = 0$
e) $a_n = a_{n-1} - a_{n-2} + a_{n-3}, a_0 = 1, a_1 = 1, a_2 = 2$

Best of luck