CS4115 Mid-Term Exam

Spring, 2008/2009

Name: _____

Student I.D.: _____

- Exam is worth 20% of overall course grade

Let d be the last digit of your UL student ID and let S_d be the sequence of six numbers given by $(d + i \cdot 7) \bmod 10, 1 \leq i \leq 6$.

The following table shows these values; please circle the column of the table that corresponds to the last digit of your ID.

i	1	2	3	4	5	6	7	8	9
1	8	9	0	1	2	3	4	5	6
2	5	6	7	8	9	0	1	2	3
3	2	3	4	5	6	7	8	9	0
4	9	0	1	2	3	4	5	6	7
5	6	7	8	9	0	1	2	3	4
6	3	4	5	6	7	8	9	0	1

BST Tree Operations (5 marks each)

1. Insert the values of S_d in a BST, showing each of the six BSTs.

2. Now delete the first three values that you inserted in that order, from the tree. Show the tree after each deletion.

Bad AVL Trees (5 marks)

1. (a) Draw the worst, most imbalanced AVL tree on 5 levels.
   (b) For an AVL tree on h levels write down the recurrence relation that determines the smallest possible no. of nodes.

Binary Search Trees (5 marks)

1. For a Binary Search Tree with a full complement of nodes on each level
   (a) How many nodes will be on the i^{th} level?
   (b) How many comparisons would have been done if a search ended (successfully) at a node on level i?
   (c) What is the *total* no. of comparisons made if we search in turn for every one of the items in the tree?

Rough Work: