Spring 2013 CS 401 Homework 1

State all necessary assumptions clearly.
Due date: Feb 7, 2013, in class

1. Prove by induction: $(n+1)^2 = n^2 + 2n + 1$

2. There are $2n$ men. In how many ways can they be paired up?

3. Exercise 1.2

4. Exercise 1.3

5. Read and understand Footnote 2 on pages 16-17. Then, show that:

    (a) The graph in Fig 1.3(a) cannot arise as the conflict graph in an instance of Interval Scheduling

    (b) The graph in Fig 1.3(b) cannot arise as the conflict graph in an instance of Bipartite Matching

6. Exercise 2.3

7. Exercise 2.4

8. Consider the heap implementation of a priority queue. Let H be a heap on n elements. Prove the following.

    (a) `StartHeap`(n) takes $O(n)$ time

    (b) `Insert`(H, v) to insert element v in H takes $O(\log n)$ time

    (c) `ExtractMin`(H) takes $O(\log n)$ time