**CMPT435 Algorithm Design and Analysis**

**Final Exam**

**Part II**

**Student Name:**

**Instructions:**

**1. This is a take-home examination.**

**3. Answer all the questions, and submit to iLearn before 05/11/17 midnight.**

**4. Answer each question in the space provided.**

**Total:**

1. Using iteration method, find a tight bound for the solution of the following recurrence equation.

T(n) = T(n/2) + 1, n > 1. Assume T(1) = 1 (5 points).

1. Show step by step how the quicksort algorithm sorts the array 7, 2, 4, 9, -3, 11. Indicate at each step what the pivot is (5 points).
2. We are given an array of n numbers A in an arbitrary order. Design an algorithm to find the **maximum** and the **fourth maximum** number in A using minimum number of comparisons.

Full credit (15 points) will be awarded for an algorithm that makes minimum number of comparisons. Algorithms that make more comparisons will be scored out of 10 points.

(i) describe the idea behind your algorithm in English (5 points);

(ii) provide pseudocode (5 points);

(iii) analyze the number of comparisons your algorithm makes (5 points).