

CONCORDIA UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING
COMP 6651: Algorithm Design Techniques
Fall 2015
Quiz # 2

First Name	Last Name	ID#
------------	-----------	-----

Question 1

1. Recall the 5 steps of the SELECT algorithm for computing the k order of a set of n numbers.
2. What is the complexity of each step?
3. What is the overall complexity?
4. Provide the output of each step on the numerical example (no need to copy the values that remain unchanged from one step to the next).

Step 1.

Complexity of Step 1.

Step 2.

Complexity of Step 2.

Step 3.

Complexity of Step 3.

Step 4.

Complexity of Step 4.

Step 5.

Complexity of Step 5.

Overall Complexity

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
17	110	112	27	5	19	13	49	51	122	3	213	21	34	21
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
17	110	112	27	5	19	13	49	51	122	3	213	21	34	21
31	32	33	34	35	36	37	38	39	40	41	42	43		
17	110	112	27	5	19	13	49	51	122	3	213	21		

After Step 1.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43		

After Step 2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43		

After Step 3.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43		

After Step 4.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43		

After Step 5.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43		

Next Step?

Question 2

Propose a greedy algorithm that solves exactly the following location problem for mobile phone stations. Provide the complexity of your algorithm, and sketch the proof of why your algorithm is optimal.

Input: the locations of n houses along a straight line We want to place cell phone base stations along the road so that every house is within 4 miles of one of the base stations.

Output: a minimal set of base stations.

Assumption: No pair of two successive house locations are more than 8 miles apart.



Extra Question

Draw the curves of $\log x$, \cos , e^x .

