

Fall 2013 CSE310 Midterm 2B (in class)

Instructions:

- There are six problems in this paper. Please use the space provided (below the questions) to write the answers.
- Budget your time to solve various problems (roughly 15 minutes for each problem) and avoid spending too much time on a particular question.
- This is a **closed book** examination. You may not consult your books/notes. Cell phones and computers are not allowed. However, you can use a basic calculator.
- You are **NOT** supposed to use a pencil. If you use a pencil, you cannot challenge your grade after the midterm is graded.

NAME	
ASUID	
Question	Score
P1	
P2	
P3	
P4	
P5	
P6	
Total	

Problem 1B. (10 points: 2 + 2 + 2 + 2 + 2)

Array A contains 10 elements from index 1 to index 10 as shown in the following.

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	18	16	14	12	10	8	6	4	2	0

Suppose you are applying the linear time buildheap algorithm to build a **min-heap** from the 10 elements of array A . For $i = 5, 4, 3, 2, 1$, show the array structure after the call to $\text{min-heapify}(A, i)$ is completed, using the table provided below.

- After $\text{min-heapify}(A, 5)$, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	18	16	14	12	0	8	6	4	2	10

- After $\text{min-heapify}(A, 4)$, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	18	16	14	2	0	8	6	4	12	10

- After $\text{min-heapify}(A, 3)$, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	18	16	6	2	0	8	14	4	12	10

- After $\text{min-heapify}(A, 2)$, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	18	0	6	2	10	8	14	4	12	16

- After $\text{min-heapify}(A, 1)$, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	0	2	6	4	10	8	14	18	12	16

Problem 2B. (10 points: 2 + 2 + 2 + 2 + 2)

Array B contains 10 elements from index 1 to index 10 as shown in the following.

i	1	2	3	4	5	6	7	8	9	10
$B[i]$	0	2	4	6	8	10	12	14	16	18

Suppose you are inserting these 10 elements (in the given order) into an originally empty **min-heap**, implemented in array A . For $i = 6, 7, 8, 9, 10$, show the array structure after the first i elements are inserted into the **min-heap**, using the table provided below.

- After inserting the first 6 elements, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	0	2	4	6	8	10				

- After inserting the first 7 elements, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	0	2	4	6	8	10	12			

- After inserting the first 8 elements, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	0	2	4	6	8	10	12	14		

- After inserting the first 9 elements, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	0	2	4	6	8	10	12	14	16	

- After inserting the first 10 elements, the array structure is:

i	1	2	3	4	5	6	7	8	9	10
$A[i]$	0	2	4	6	8	10	12	14	16	18