Systems Programming

Second miterm exam - Groups 65, 69 and 79

Part 1 - Theory (3 points) - 20 minutes

Each correct answer adds 0.3 points and each incorrect answer substracts 0.1 points

Q1	What does this method on a linked list like the ones we have programmed in class, where first is the reference to the first node in the list.
	
	`public void method(){`
	`  if(first != null){`
	`  Node aux = first;`
	`  while(aux.getNext()!=null){`
	`  aux = aux.getNext();`
	`  }`
	`  System.out.println(aux.getInfo());`
	`  }`
	`}`

1)	Prints the last element on the list.
2)	Prints the second-to-last element on the list.
3)	Prints all the elements on the list.
4)	Prints the first element of the list.

Q2	Given an empty stack, what does the call to top() return after the next sequence of method calls are executed: push(5); top(); pop(); push(2); push(3); pop(); pop();
1)	null or an exception would be thrown because the stack is empty.
2)	3
3)	5
4)	2

Q3	Given a non-empty linked list that stores objects of type Integer, and that contains more than one element, if the method m is called, which node does current point to after exiting the while loop?
	
	`public void m() {`
	`  Node current = this.first;`
	`  while(current != null) {`
	`  current = current.getNext();`
	`  }`
	`}`

1)	To no node (i.e. null).
2)	To the last node on the list.
3)	To the first node on the list.
4)	To the second-to-last node on the list.

Q4	In a deque (double-ended queue), which of the following statements is correct?
1)	For a more efficient implementation it should be programmed with a doubly linked list.
2)	For a more efficient implementation it should be programmed with an array
3)	With its -insertLast()- and -removeFirst()- methods we are able to use the deque as a stack.
4)	With its -insertFirst()- and -removeFirst()- methods we are able to use the deque as a queue.

Q5	If we insert one by one the elements of the following array (3,1,2,5,7,4,6) in a binary search tree, which node would be the left child of the node whose value is 5 after finishing the insertion process?
1)	4
2)	6
3)	null
4)	2

Q6	Given the binary tree of objects of type -Integer-, represented by the following array, and considering that these objects act as the key, is this binary tree a heap? {15, 27, 41, 32, 59, 63, 95, 80, 77, null, null, null, null, null, null}
1)	Yes; it is a min-heap.
2)	No; it is not a heap since it does not meet the criteria to be either min-heap or max-heap.
3)	No; it is not a heap because it is not complete.
4)	Yes; it is a max-heap.

Q7	Given the binary tree represented by the array {A, B, C, D, E, F}, what would be the result of traversing this tree in post-order?
1)	D, E, B, F, C, A.
2)	B, D, E, C, F, A.
3)	A, B, D, E, C, F.
4)	D, E, B, A, C, F.

Q8	Given a min-heap represented by the array {"a", "d", "f", "e", "g"} and using objects of type String as both the info and the key, what would be the content of the array that represents the heap after executing the following operations: insert("c"); extract();, considering that extract() extracts the root of the min-heap.
1)	"c", "d", "f", "e", "g"
2)	"a", "d", "c", "e", "g", "f"
3)	"d", "e", "c", "f", "g"
4)	"f", "d", "c", "e", "g"

Q9	Regarding the efficiency of the search algorithms studied in class (linear and binary), taking into account that N is the number of elements, which of the following sentenes is correct?
1)	The binary search is more efficient than the linear search for large values of N.

2)	The linear search is more efficient than the binary search for large values of N.
3)	The linear search has a complexity of O(logN).
4)	The binary search has a complextiy of O(N).

Q10	How many swaps does the Bubble Sort algorithm needs to sort this array of integers from the lowest to the highest? {45, 22, 39, 12}
1)	5
2)	4
3)	3
4)	2

PREGUNTA	SOLUCIÓN
Q1	1
Q2	1
Q3	1
Q4	1
Q5	1
Q6	1
Q7	1
Q8	1
Q9	1
Q10	1