Tutorial 4

1. Suppose that *S* is a stack. List the content of the stack after each operation and show the output value if a value is returned from the operation.

Operation	Output	Bottom – Stack – Top
S.stack_init( )		
S.empty( )		
S.push(8)		
S.push(-5)		
S.pop( )		
S.push(2)		
S.top( )		
S.pop( )		
S.empty( )		
S.top( )		

2. Suppose that *Q* is a queue. List the content of the queue after each operation and show the output value if a value is returned from the operation.

Operation	Output	Front – Queue – Rear
Q.queue_init( )		
Q.empty( )		
Q.enqueue(8)		
Q.enqueue(-5)		
Q.dequeue( )		
Q.enqueue(2)		
Q.front( )		
Q.dequeue( )		
Q.empty( )		
Q.front( )		

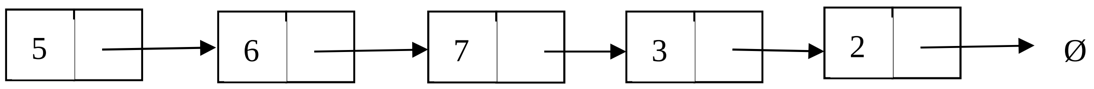
3. Using the abstract data type *stack*, write a function *invert(s)* to invert the contents of a stack. You may use additional stacks in your function.
   Note: If the number 3 is at the top of the stack *s*, after *invert(s)*, 3 will be at the bottom of *s*.

4. Suppose that *start* is a reference to the first node of a singly-linked list. Write an algorithm that is passed *start* and a value *val*. The algorithm adds a node to the end of the linked list whose data field is *val*. What is the worst case time complexity of your algorithm?

5. A pointer *start* points to the first element of a doubly-linked list *L*. Write an algorithm that deletes the smallest element in *L*.

6. Using the operations *front()*, *enqueue(val)* and *dequeue()*, write the pseudo-code of a recursive algorithm to append a queue *P* (which may be empty) onto the end of another queue *Q*, leaving *P* empty.

7. The pointer *start* points to the first element of a singly-linked list *L*. Write a recursive algorithm to return a reference to the first element that has a value that is greater than the next element in *L*. If no such element exists, return null. For example if the linked list is the following



then the algorithm will return a reference to the third element (which has the value "7").