

Exercises

The following is a fragment of a class that maintains a singly linked list of `Objects`.

```
public class SLL {
    /*
     * Objects of this class are nodes in our singly linked list.
     */
    private static class SLLNode {
        private Object data; // the data stored in this node
        private SLLNode next; // the link to the next node
        /*
         * Constructor for an SLLNode with data and next fields as given.
         */
        private SLLNode(Object data, SLLNode next) {
            this.data = data;
            this.next = next;
        }
    }

    private SLLNode head = null; // head of the list, or null
}
```

Write the following methods. Method names are up to you. Parameter and return types can be deduced from the descriptions.

1. Write a method that adds an element to the head of the list.
2. Write a method that replaces the element that is the head with a different element. Assume the list contains at least one element.
3. Write a method that removes the first element from the list and returns it. Assume the list contains at least one element.
4. Write a method that returns the first element from the list, without changing the list. If the list does not contain at least one element, throw a `NoSuchElementException`.
5. Write a method that returns the third element in the list, not changing the list. Assume the list contains at least three elements.
6. Write a method that returns the last element from the list, without changing the list. Assume the list contains at least one element.
7. Write a method that removes the last element from the list and returns it. Assume the list contains at least one element.
8. Write a method that returns the *i*th element of the list, counting from 0. If the list does not contain an *i*th element, throw a `NoSuchElementException`.
9. Write a method that inserts an element at the *i*th position. Assume the list already contains at least *i* elements.
10. Write a method that reverses the list.

Bring your solutions in hard copy (printed or handwritten) to class on Wednesday, April 19.