Homework 3

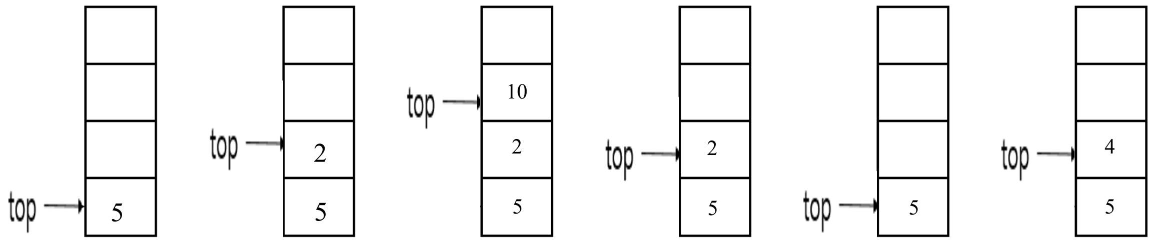
M1522.000900 Data Structure (2019 Fall)

2013-12815 Dongjoo Lee

Question 1.

1. **False.** Singly linked list has no member indicating the previous node. It takes $\theta(\text{n})$ time to find previous node from the head.
2. **True.** Doubly linked list has previous node member so it can access to previous node in $\theta(1)$ no matter where the current position is.
3. **False.** For example, to insert new node, it is needed to access every next nodes in array-based list. So, it takes $\theta(\text{n})$ in general.
4. **True.** Compared with Array-based list, that is required only memory for the information, It is needed some extra memory space for linked list.
5. **True.** For example, when top of the stack points to the leftmost index, we can implement "PUSH" by "return listArray[Top++];".

Question 2.



Question 3. (* Let's pretend there was Stack implements Stack ADT on page 6)

1st TODO:

```
s.push(Integer.toString(i)); // following left parenthesis' position
```

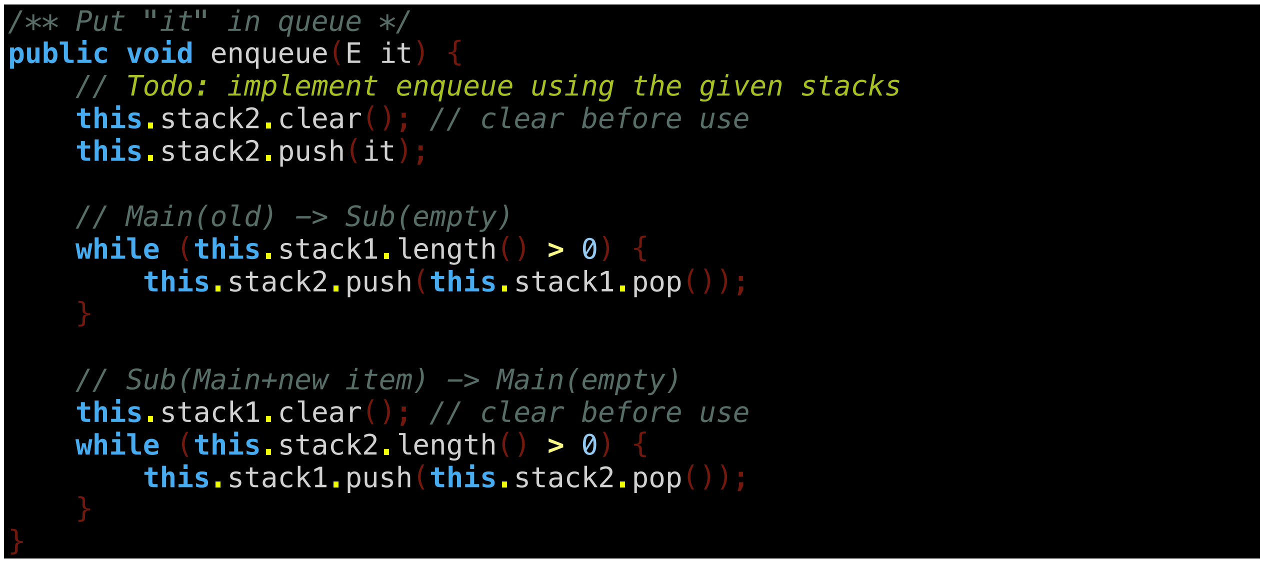
2nd TODO:

```
if (c != ')') continue; // If input sentence contains not only parenthesis

if (s.length() == 0) { // there was no ( before
    return i;
}

s.pop(); // Pairing SUCCESS
if (s.length() == 0) { // Input sentence is well balanced until now.
    position = -1;
}
```

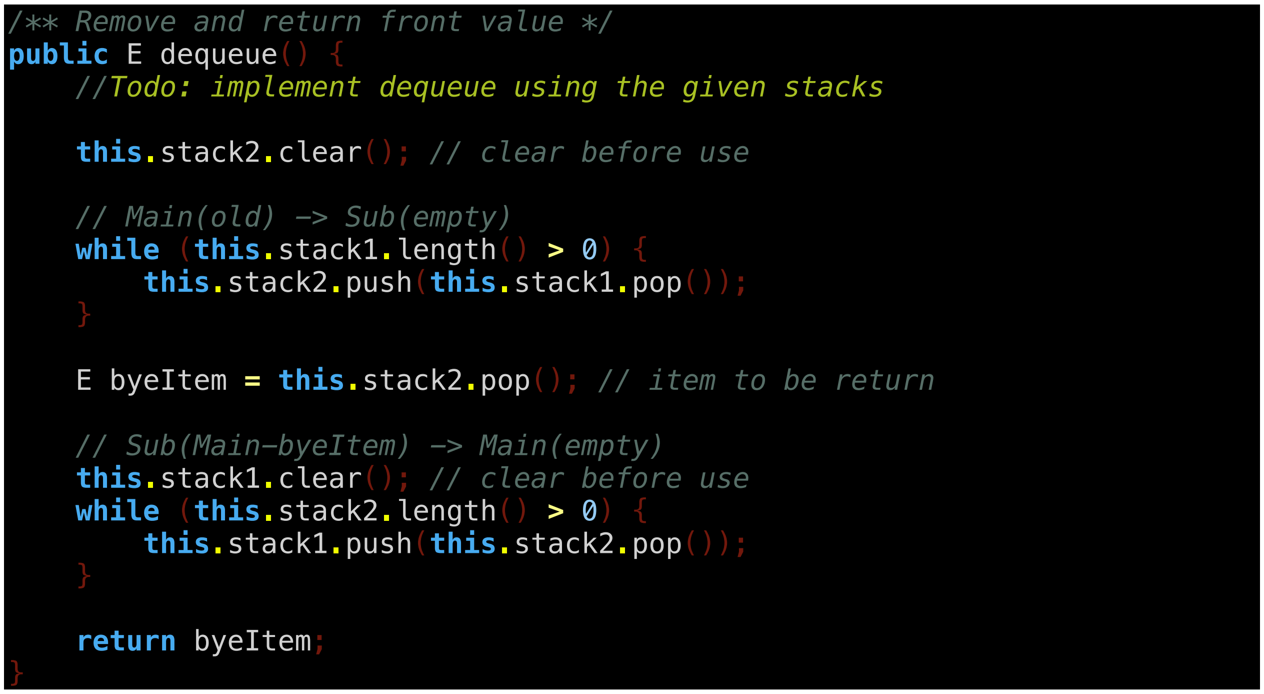
Question 4.



```
/** Put "it" in queue */
public void enqueue(E it) {
    // Todo: implement enqueue using the given stacks
    this.stack2.clear(); // clear before use
    this.stack2.push(it);

    // Main(old) -> Sub(empty)
    while (this.stack1.length() > 0) {
        this.stack2.push(this.stack1.pop());
    }

    // Sub(Main+new item) -> Main(empty)
    this.stack1.clear(); // clear before use
    while (this.stack2.length() > 0) {
        this.stack1.push(this.stack2.pop());
    }
}
```



```
/** Remove and return front value */
public E dequeue() {
    //Todo: implement dequeue using the given stacks

    this.stack2.clear(); // clear before use

    // Main(old) -> Sub(empty)
    while (this.stack1.length() > 0) {
        this.stack2.push(this.stack1.pop());
    }

    E byeItem = this.stack2.pop(); // item to be return

    // Sub(Main-byeItem) -> Main(empty)
    this.stack1.clear(); // clear before use
    while (this.stack2.length() > 0) {
        this.stack1.push(this.stack2.pop());
    }

    return byeItem;
}
```