

1 Array Insertion

Write a method that inserts `val` into the given position in `x`. For example, if `x = [5, 9, 14, 15]`, `val = 6`, and `position = 2`, then the method should return `[5, 9, 6, 14, 15]`. You may assume the position is valid.

```
public static int[] insert(int[] x, int val, int position) {
```

```
}
```

Is it possible to write a version of this method that returns `void` and changes `x` in place (i.e. destructively)?

2 Singly Linked Lists

For the following problems, use the following implementation of an `SNode`:

```
public class SNode {
    public SNode next;
    public double val;
    public SNode(double val, SNode next) {
        this.next = next;
        this.val = val;
    }
}
```

Given the following structure for a singly linked list, write a method to insert elements into the given position. If the position is invalid, insert the new node at the end of the list. For example, if the SList is 5 → 6 → 2, insert(10, 1) would result in 5 → 10 → 6 → 2.

```
public class SList {
    private SNode head;
    public void insert(double val, int position) {

    }
}
```

3 Sentinel Nodes

Given the the following structure for a singly linked list using sentinel nodes, write a method to insert elements into it. If the position is invalid, insert the new node at the end of the list.

```
public class SentinelSList {
    private SNode front;
    private SNode back;
    public SentinelSList() {
        this.back = new SNode(0, null);
        this.front = new SNode(0, back);
    }
    public void insert(double val, int position) {

    }
}
```

Challenge Problem: Write a method `xify(int[] x)` that replaces the *i*th number with *x*[*i*] copies of itself. For example, `xify([3, 2, 1])` would return `[3, 3, 3, 2, 2, 1]`.