CS 311 Worksheet Big O Notation

1. What are the three-time complexity notations and what do each of them mean?

2. What are the worst and best time complexities of this simple linear search code.

```
int linearSearch(int arr[], int n, int target) {
    for (int i = 0; i < n; i++) {
        if (arr[i] == target)
            return i; // Found at index i
    }
    return -1; // Not found
}
```

3. What is the time complexity (big O) of bubble sort?

```
void bubbleSort(int arr[], int n) {
    for (int i = 0; i < n - 1; i++) {
        // Last i elements are already sorted
        for (int j = 0; j < n - i - 1; j++) {
            // Swap if elements are in the wrong order
            if (arr[j] > arr[j + 1]) {
                // Swap using a temp variable
                int temp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = temp;
            }
        }
    }
}
```

4. What is the time complexity (big O) of selection sort?

```
void selectionSort(int arr[], int n) {
    for (int i = 0; i < n - 1; i++) {
        // Assume the i-th element is the minimum
        int minIndex = i;

        // Find the actual minimum in the unsorted part
        for (int j = i + 1; j < n; j++) {
            if (arr[j] < arr[minIndex])
                minIndex = j;
        }

        // Swap if a new minimum was found
        if (minIndex != i) {
            int temp = arr[i];
            arr[i] = arr[minIndex];
            arr[minIndex] = temp;
        }
    }
}
```