Worksheet # 11 Algorithms CIS2500

Question 1: Find the time complexity in terms of Big O:

a.

```
int count;
int n;
int sum = 0;

scanf (“%d”, &n);

count = 0;
while (count < n) {

   sum = sum + count;
   count++;
}
```

O(n)

b.

```
int i, j, n;

scanf (“%d”, &n);
for (i = 1; i <= n; i++) {
   for (j = 0; j < 500; j++) {

       sum = sum + i;
   }
}
```

O(n)

c.

```
int fun (int n) {

   for (i = 1; i <= n; i++){
      printf (∗);
   }
}

int main () {

   int i, n;

   scanf (“%d”, &n);
   for (i = 1; i <= n; i++) {
        sum = sum + fun (i);
   }
   return 0;
}
```

O(n^2)

Question 2a: A linear search is performed on this list. How many comparisons would it take to find 6?

20, 4, 5, 90, -8, 6, 17, 39 6

Question 2b: (Trick question ☺) A binary search is performed on this list. How many comparisons would it take to find 6?

20, 4, 5, 90, -8, 6, 17, 39 Sequence is not ordered

Question 2c: A binary search is performed on this list. How many comparisons would it take to find 6?

-8, 4, 5, 6, 17, 20, 39, 90 1

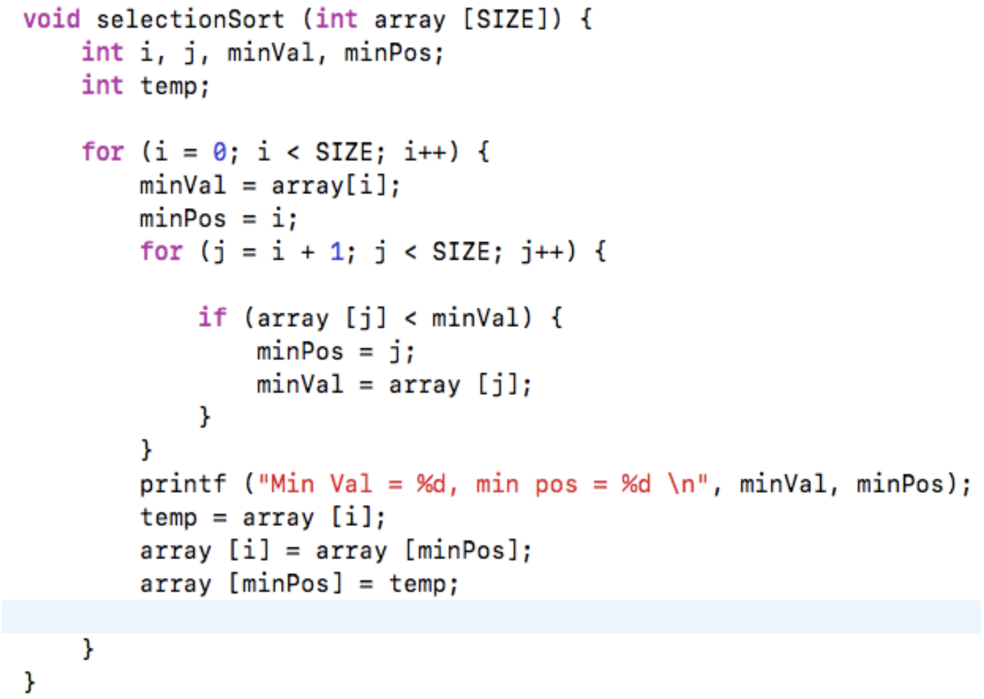
Question 2d: A binary search is performed on this list. How many comparisons would it take to find 39?

-8, 4, 5, 6, 17, 20, 39, 90 3

Bubble Sort

Question 3a: What is the state of this array after pass II (2nd iteration of the outer loop) of ~~each~~ algorithm: 20, 4, 5, 90, -8, 6, 17, 39 4 5 -8 6 17 20 39 90

3b. What is the best and worst case time complexity of the following algorithm?



```
void selectionSort (int array [SIZE]) {
    int i, j, minVal, minPos;
    int temp;

    for (i = 0; i < SIZE; i++) {
        minVal = array[i];
        minPos = i;
        for (j = i + 1; j < SIZE; j++) {

            if (array [j] < minVal) {
                minPos = j;
                minVal = array [j];
            }
        }
        printf ("Min Val = %d, min pos = %d \n", minVal, minPos);
        temp = array [i];
        array [i] = array [minPos];
        array [minPos] = temp;

    }
}
```