Week 2 Day 2 Lab Coding Challenges

Question 1:

Consider the following code snippet

```
for(int j=0; j<n; j*=2){
    System.out. println(i);
}
```

Find the time complexity of the above code snippet

Question 2:

What are the worst case time complexities of the below code logics?

1.
```
for(i=1; i<n; i+2){
        System.out.println("i is: "+i);
}
```

2.
```
for(i=1; i<n; i++){
        for(j=1; j<i; j++){
                System.out.println("i is: "+i);
        }
}
```

Question 3:

What are the worst case time complexities of the below code logics?

1.
```
while(i<n){
        Stmt;
        i++;
}
```

2.
```
a=1;
while(a<b){
        stmt;
        a=a*2;
}
```

Question 4:

What are the worst case time complexities of the below code logics?

1.
```
p  = 0;
for(i=1; p<n; i++){
        p = p+i;
}
```

2.
```
i = n
while(i>1){
        stmt;
        i=i/2;
}
```

Question 5:

Find the Worst case time complexity of the below program.

```
for j = 2 to A.length
        key = A[j]
        i = j-1
        while i>0 and A[i] > key
                A[i+1] = A[i]
                i = j-1
        A[i+1] = key
```

(Assume A.length as n)

S.No	Code	No of times of execution	Cost for 1 execution	Total cost for an execution
1	for j = 2 to A.length	n	C1	C1 * n
2	key = A[j]	n-1	C2	C2 * n-1
3	i = j-1	n-1	C3	C3 * n-1
4	while i>0 and A[i] > key	n-1 | n(n-1)/2	C4	C4 * n-1 (best) Or C4 * n(n-1)/2 (worst)

5	A[i+1] = A[i]	0 | n(n-1)/2	C5	C5 * n-1 (best) Or C5 * n(n-1)/2 (worst)
6	i = i-1	0 | n(n-1)/2	C6	C6 * n-1 (best) Or C6 * n(n-1)/2 (worst)
7	A[i+1] = key	n-1	C7	C7 * n-1

Time complexity when min time of while loop is considered is,
C1 * n + C2 * n-1 + C3 * n-1 + C4 * n(n-1)/2 + C5 * n(n-1)/2 + C6 * n(n-1)/2 + C7 * n-1
= $a^{l}n^2 + b^{l}n + c^{l}$
Hence, in the worst case scenario we have $O(n^2)$.