Name: Susmitha Shailesh Date: 9/12/19

Pledge: I pledge my honor that I have abided by the Stevens Honor System.

Give the complexity of the following functions. Choose the most appropriate notation from among O, θ, and Ω.

1.
```
void function1(int n) {
    for (int i = 1; i <= n; i++) {
        for (int j = i; j <= n; j += 2) {
            cout << "*";
        }
    }
}
```
Answer: $\theta(n^2)$

2.
```
void function2(int n) {
    int count = 0;
    for (int i = 1; i * i <= n; i++) {
        count++;
    }
    cout << count;
}
```
Answer: $\theta(\sqrt{n})$

3.
```
void function3(int n) {
    int count = 0;
    for (int i = n/2; i <= n; i++) {
        for (int j = 1; j + n/2 <= n; j++) {
            for (int k = 1; k <= n; k *= 2) {
                count++;
            }
        }
    }
    cout << count;
}
```
Answer: $\theta(n^2 lg(n))$

4.
```
void function4(int n) {
    int count = 0;
    for (int i = n/2; i <= n; i++) {
        for (int j = 1; j <= n; j *= 2) {
            for (int k = 1; k <= n; k *= 2) {
                count++;
            }
        }
    }
    cout << count;
}
```
Answer: $\theta(n\ lg^2(n))$

5.
```
void function5(int n) {
    if (n % 2 == 0) {
        return;
    }
    for (int i = 1; i <= n; i++) {
        for (int j = 1; j <= n; j++) {
            cout << "*";
            break;
        }
    }
}
```
Answer: $O(n)$

6.
```
void function6(int n) {
    int count = 0;
    for (int i = 1; i <= n/2; i++) {
        for (int j = 1; j <= n/3; j++) {
            for (int k = 1; k <= n/4; k++) {
                count++;
            }
        }
    }
    cout << count;
}
```
Answer: $\theta(n^3)$

7.
```
void function7(int n) {
    for (int i = 1; i <= n; i++) {
        for (int j = 1; j <= n; j += i) {
            cout << "*";
        }
    }
}
```
Answer: $\theta(n\ lg(n))$

8.
```
void function8(int n) {
    int i = 1, s = 1;
    while (s <= n) {
        i++;
        s += i;
        cout << "*";
    }
}
```
Answer: $\theta(\sqrt{n})$

9. Processing Arrays
    a. Suppose you have an unsorted array of integers of length n and want to sum all the elements inside it. What is the running time of your algorithm? $\theta(n)$

b. Suppose you have an unsorted array of integers of length n and want to determine if all the values inside are positive. What is the running time of your algorithm? $O(n)$
c. Suppose you have a sorted array of integers of length n and want to determine the median value. What is the running time of your algorithm? $\theta(1)$

10. True T / F $f(n) = 3n^2 + 4n + 2 \in \theta(n^2)$

If true, prove it by giving *integral* values for the required constants c_1, c_2, and n_0. Choose the tightest values possible for the c_1 and c_2 constants. If false, show the contradiction.

$c_1 = 3$

$c_2 = 4$

$n_0 \geq 5$

Lower: $3n^2 + 4n + 2 \geq 3n^2$

Upper: $3n^2 + 4n + 2 \leq 4n^2$