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Pledge: “I pledge my honor that I have abided by the Stevens honor system." - Mitra Modi

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: $O(\sqrt{(n)})$

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: $\theta(nlg(n)^2)$

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: $O(n^2)$

8.
```
void function8(int n) {
    int i = 1, s = 1;
    while (s <= n) {
        i++;
        s += i;
        cout << "*";
    }
}
```

Answer: $O(n)$

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?

   If the length of the array can be found in constant time, then the algorithm is $\theta(1)$,

   If the length of the array must be found through iteration, then the algorithm is $O(n)$.

10. ***TRUE*** $f(n) = 3n^2 + 4n + 2 \in \theta(n^2)$

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.

$C_1 = 3, C_2 = 4, N_0 = 5$

$3n^2 \leq 3n^2 + 4n + 2 \leq 4n^2; n \geq 5$

$C_0 = 3, C_1 = 6, N_0 = 2$

$3n^2 \leq 3n^2 + 4n + 2 \leq 6n^2; n \geq 2$