

Class: CS 3305

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Assignment: 1

**A.**

```
sum = 0;
for (int i = 0; i < n; i++)
    Sum++;
```

1 operation  
N operations  
N operation

**Runtime Analysis:  $1 + N + N = O(N)$**

**B.**

```
sum = 0;
for (int i = 0; i < n; i++)
    for (int j = 0; j < n; j++)
        Sum++;
```

1 operation  
N operations  
N operations  
N operation

**Runtime Analysis:  $1 + N(N+N) = O(N^2)$**

**C.**

```
sum = 0;
for (int i = 0; i < n; i++)
    for (int j = 0; j < n * n; j++)
        Sum++;
```

1 operation  
N operation  
 $N^2$  operation  
1 operation

**Runtime Analysis:  $1 + N(N^2) = O(N^3)$**

**D.**

```
sum = 0;
for (int i = 0; i < n; i++)
    for (int j = 0; j < i; j++)
        Sum++;
```

1 operation  
N operations  
N operations  
N operations

**Runtime Analysis:  $1 + N(N+N) = O(N^2)$**

**E.**

```
sum 0;
for (int i = 0; i < n; i++)
    for (int j = 0; j < i * i; j++)
        for (int k = 0; k < j; k++)
            Sum++;
```

1 operation  
N operations  
 $N^2$  operations  
 $N^2$  operations  
N operations

**Runtime Analysis:  $1 + N * N^2 * (N^2+N) = O(N^5)$**

**F.**

```
sum = 0;
for (int i = 1; i < n; i++)
    for (int j = 1; j < i * i; j++)
```

1 operation  
N operations  
 $N^2$  operations

if (j % i == 0)

N operations

for (k = 0; k < j; k++)

N operations

Sum++;

N operations

**Runtime Analysis:**  $1 + N(N^2/n) * N(N) = O(N^4)$