

Complexity Homework

For questions 1-12, find the worst-case complexity

1.

```
for (int i = 3; i <= n; i++) {  
}
```

2.

```
for (int i = 3; i <= n; i+= 5) {  
}
```

3.

```
for (int i = 1; i <= n; i++) {  
    for (int j = 1; j <= n; j++) {  
    }  
}
```

4.

```
for (int i = 1; i <= n; i++) {  
    for (int j = 1; j <= i; j++) {  
    }  
}
```

5.

```
for (int i = 1; i <= n; i++) {  
    for (int j = 1; j <= i/2; j++) {  
    }  
}
```

6.

```
for (int i = 1; i <= n; i++) {  
    for (int j = 1; j <= i; j += 2) {
```

```
    }  
}
```

7.

```
for (int i = 1; i <= n; i *= 2)  
{  
}
```

8.

```
for (int i = 1; i <= n; i *= 2) {  
    for (int j = 1; j <= i; j++) {  
    }  
}
```

9.

```
for (int i = 1; i <= n; i *= 3) {  
}
```

10.

```
for (int i = 1; i <= n; i++) {  
    for (int j = 1; j <= i; j *= 2) {  
    }  
}
```

11.

```
for (int i = 1; i <= a; i++) {  
    for (int j = 1; j <= b; j++) {  
    }  
}
```

12.

```
for (int i = 3; i <= a; i += 4) {  
    for (int j = 5; j <= b; j *= 2) {  
    }  
}
```

13.

```
int f(int a) {  
    for (int i = 3; i <= a; i += 4)  
        if ((i * i + 3 * i + 2) % 2 == 0)  
            return i;  
}
```

14.

```
bool isPrime1(int p) {  
    for (int i = 2; i < p; i++)  
        if (p % i == 0)  
            return false;  
    return true;  
}
```

15.

```
bool isPrime2(int p) {  
    if (p == 2)  
        return true;  
    if (p % 2 == 0)  
        return false;  
    for (int i = 3; i < p; i += 2)  
        if (p % i == 0)  
            return false;  
    return true;  
}
```

16.

```
for (int i = 3; i <= a; i += 4) {  
    for (int j = 5; j <= b; j *= 2) {  
    }  
}
```

17. What is the complexity of the following code?

Program

Kadane	$O(\rule{1cm}{0.4pt})$	$\Omega(\rule{1cm}{0.4pt})$
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Program		
Mandelbrot	$O(\rule{1cm}{0.4pt})$	$\Omega(\rule{1cm}{0.4pt})$
Shoelace Area	$O(\rule{1cm}{0.4pt})$	$\Omega(\rule{1cm}{0.4pt})$
Floyd Warshall	$O(\rule{1cm}{0.4pt})$	$\Omega(\rule{1cm}{0.4pt})$
Intersecting Boxes	$O(\rule{1cm}{0.4pt})$	$\Omega(\rule{1cm}{0.4pt})$