

# Runtime analysis

How many steps are needed for each of the following code blocks? Classify each one as either:  $O(1)$ ,  $O(N)$ ,  $O(\log N)$ ,  $O(N \log N)$ , or  $O(N^2)$

*Credit: Jeff Knerr*

## Question 1.

(a).

```
int n = getInputSize();
for (int i = 0; i < n; i++) {
    println(i);
}
```

(b).

```
int n = getInputSize();
for (int i = 0; i < 100; i++) {
    println(i*n);
}
```

(c).

```
int n = getInputSize();
for (int i = 0; i < n; i++) {
    println(i);
}
for (int j = 0; j < n; j++) {
    println(j);
}
```

(d).

```
int n = getInputSize();
for (int i = 0; i < n; i++) {
    for (int j = 0; j < n; j++) {
        println(i, j);
    }
}
```

(e).

```
int n = getInputSize();
for (int i = 0; i < n; i++) {
    for (int j = i; j < n; j++) {
        println(i, j);
    }
}
```

(f).

```
int n = getInputSize();
for (int i = 0; i < n; i++) {
    for (int j = 0; j < 10; j++) {
        println(i, j);
    }
}
```

(g).

```
int n = getInputSize();
while (n > 1) {
    println(n);
    n = n/2;
}
```

(h).

```
int[] lst = {1,2,3,5,7,12,19,34,55,67,99,101};
int n = lst.length;
int mid = floor(n/2);
println(lst[mid]);
```

(i).

```
int n = getInputSize();
for (int i = 0; i < n; i++) {
    k = n;
    while (k > 1) {
        println(i, k);
        k = k/2;
    }
}
```