

Finish the Runtimes

Below we see the standard nested for loop, but with missing pieces!

```
1 for (int i = 1; i < _____; i = _____) {
2     for (int j = 1; j < _____; j = _____) {
3         System.out.println("We will miss you next semester Akshit :(");
4     }
5 }
```

For each part below, **some** of the blanks will be filled in, and a desired runtime will be given. Fill in the remaining blanks to achieve the desired runtime! There may be more than one correct answer.

Hint: You may find `Math.pow` helpful.

(a) Desired runtime: $\Theta(N^2)$

```
1 for (int i = 1; i < N; i = i + 1) {
2     for (int j = 1; j < i; j = _____) {
3         System.out.println("This is one is low key hard");
4     }
5 }
```

(b) Desired runtime: $\Theta(\log(N))$

```
1 for (int i = 1; i < N; i = i * 2) {
2     for (int j = 1; j < _____; j = j * 2) {
3         System.out.println("This is one is mid key hard");
4     }
5 }
```

(c) Desired runtime: $\Theta(2^N)$

```
1 for (int i = 1; i < N; i = i + 1) {
2     for (int j = 1; j < _____; j = j + 1) {
3         System.out.println("This is one is high key hard");
4     }
5 }
```

(d) Desired runtime: $\Theta(N^3)$

```
1 for (int i = 1; i < _____; i = i * 2) {
2     for (int j = 1; j < N * N; j = _____) {
3         System.out.println("yikes");
4     }
5 }
```