Nested Loops

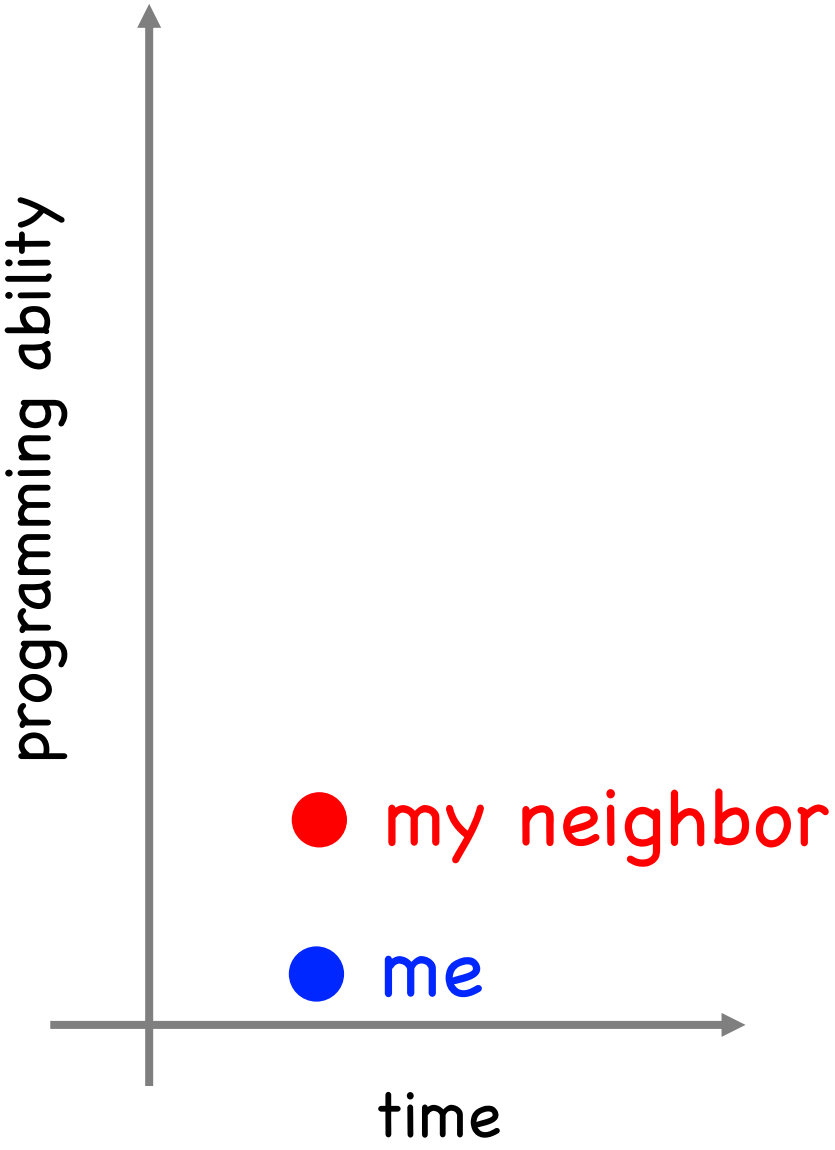
Plan for today

Green Screen
Single looping: a deeper look
Nested looping
Drawing grids

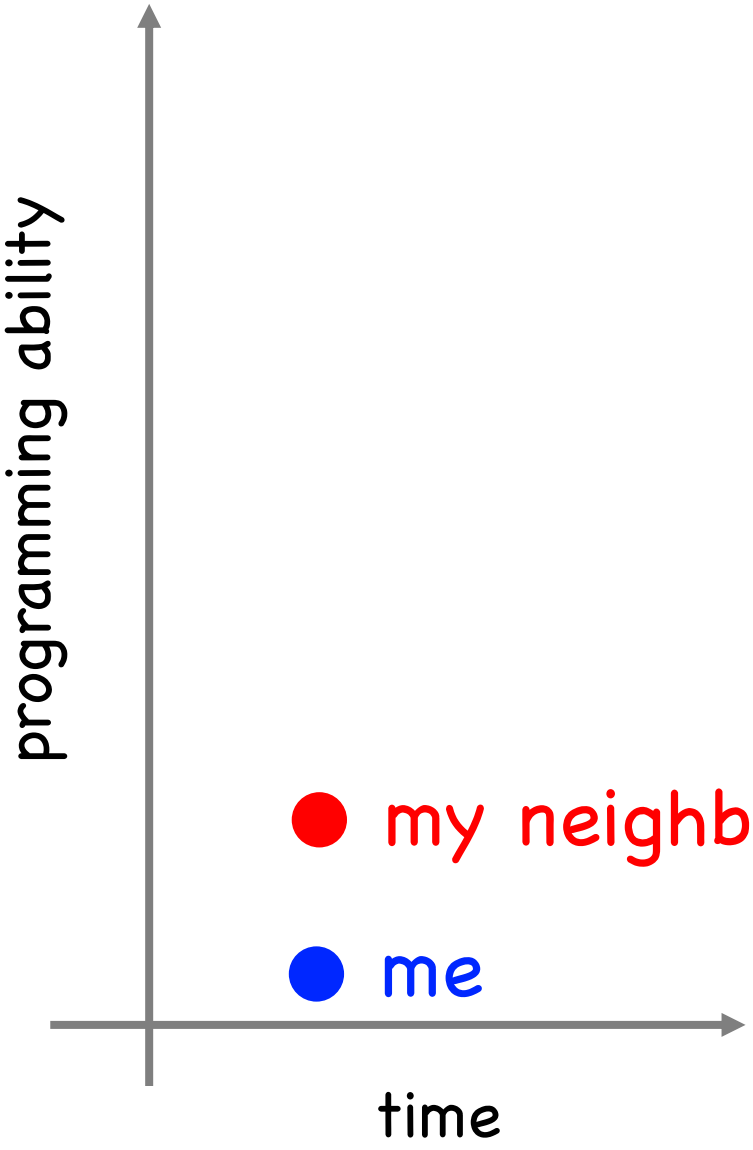
Julia in the past

Julia in the past

The beginning of my journey



The beginning of my journey

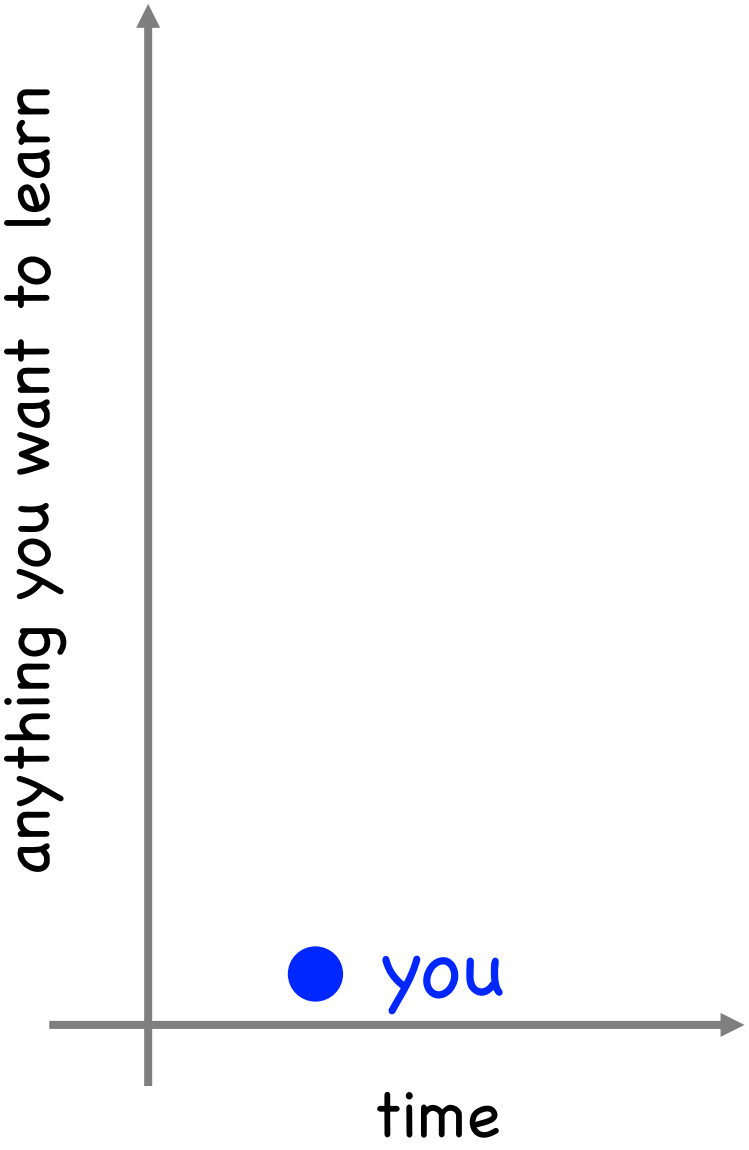


The beginning is hard for everyone.

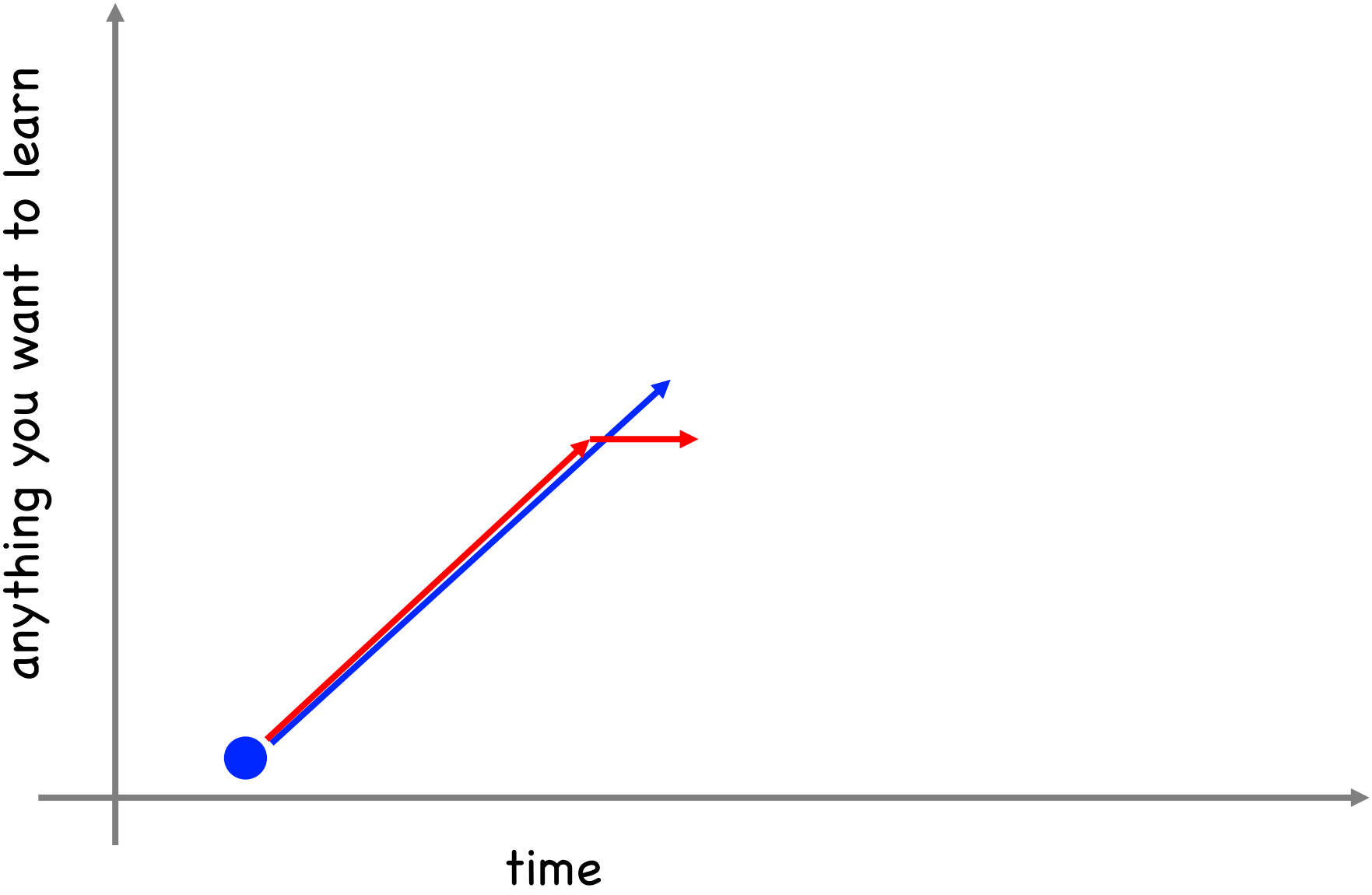
We are learning an entirely new way to think!

10x better than me?

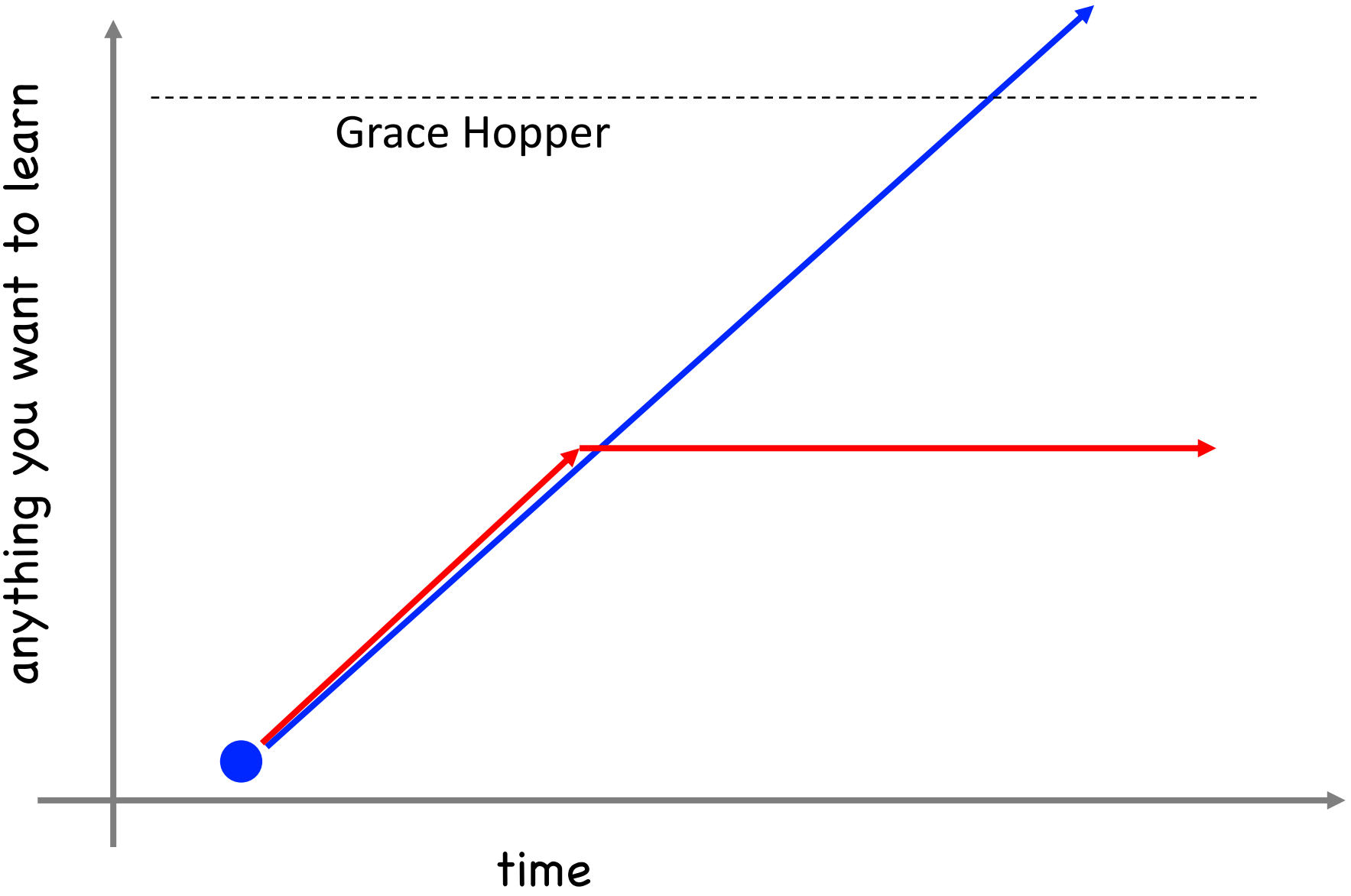
Think about yourself



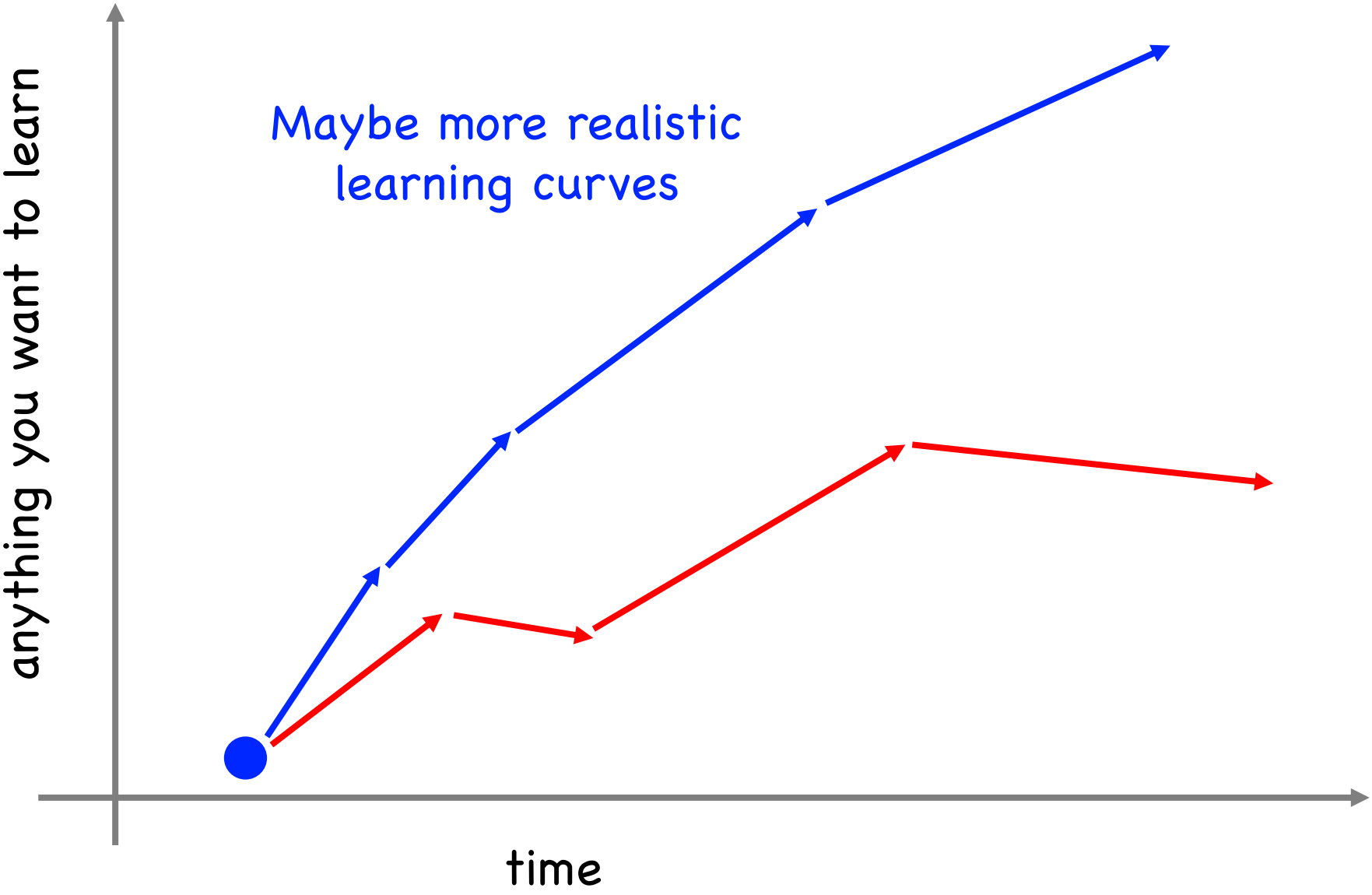
There are many learning paths



There are many learning paths



There are many learning paths



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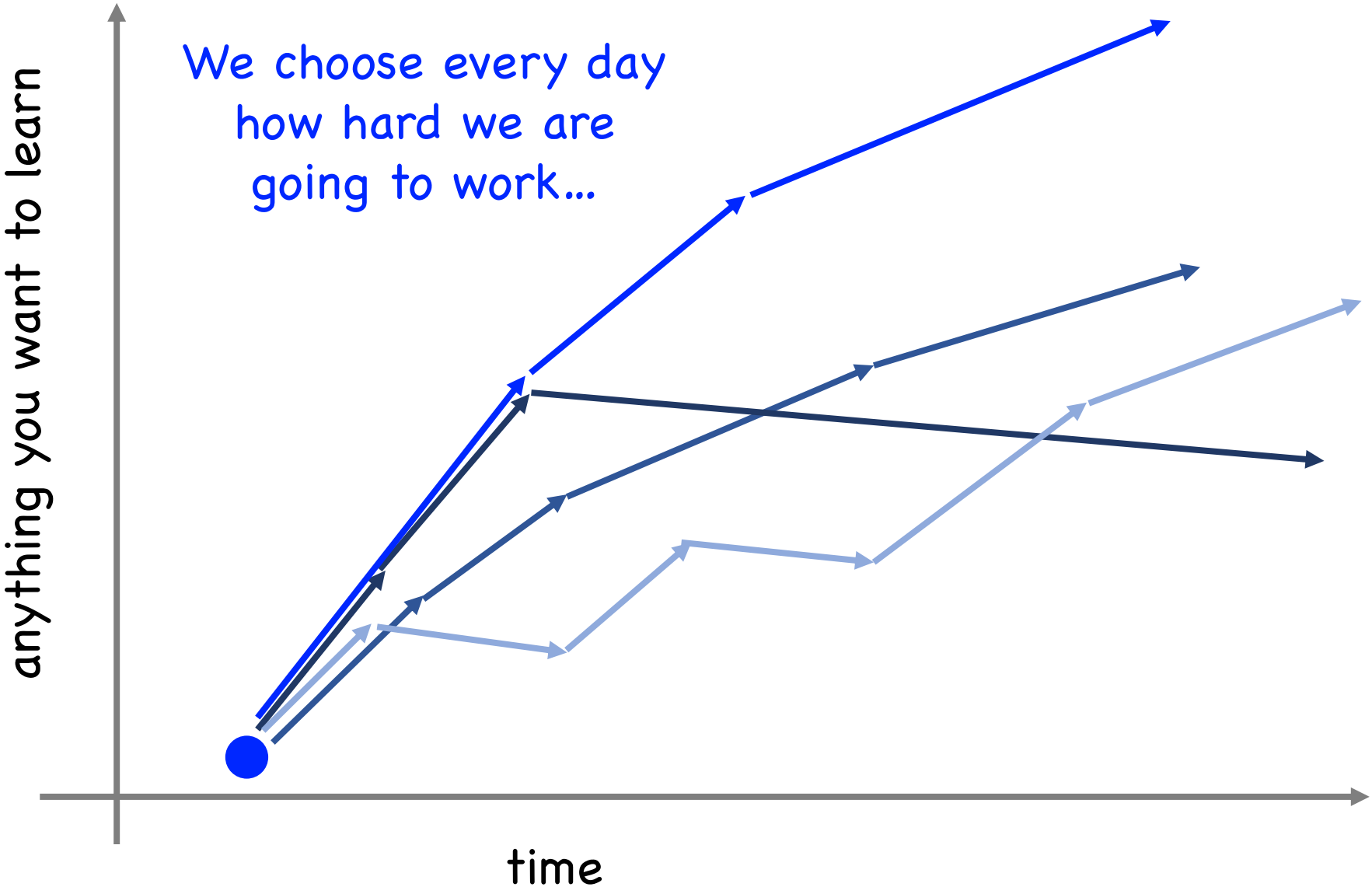
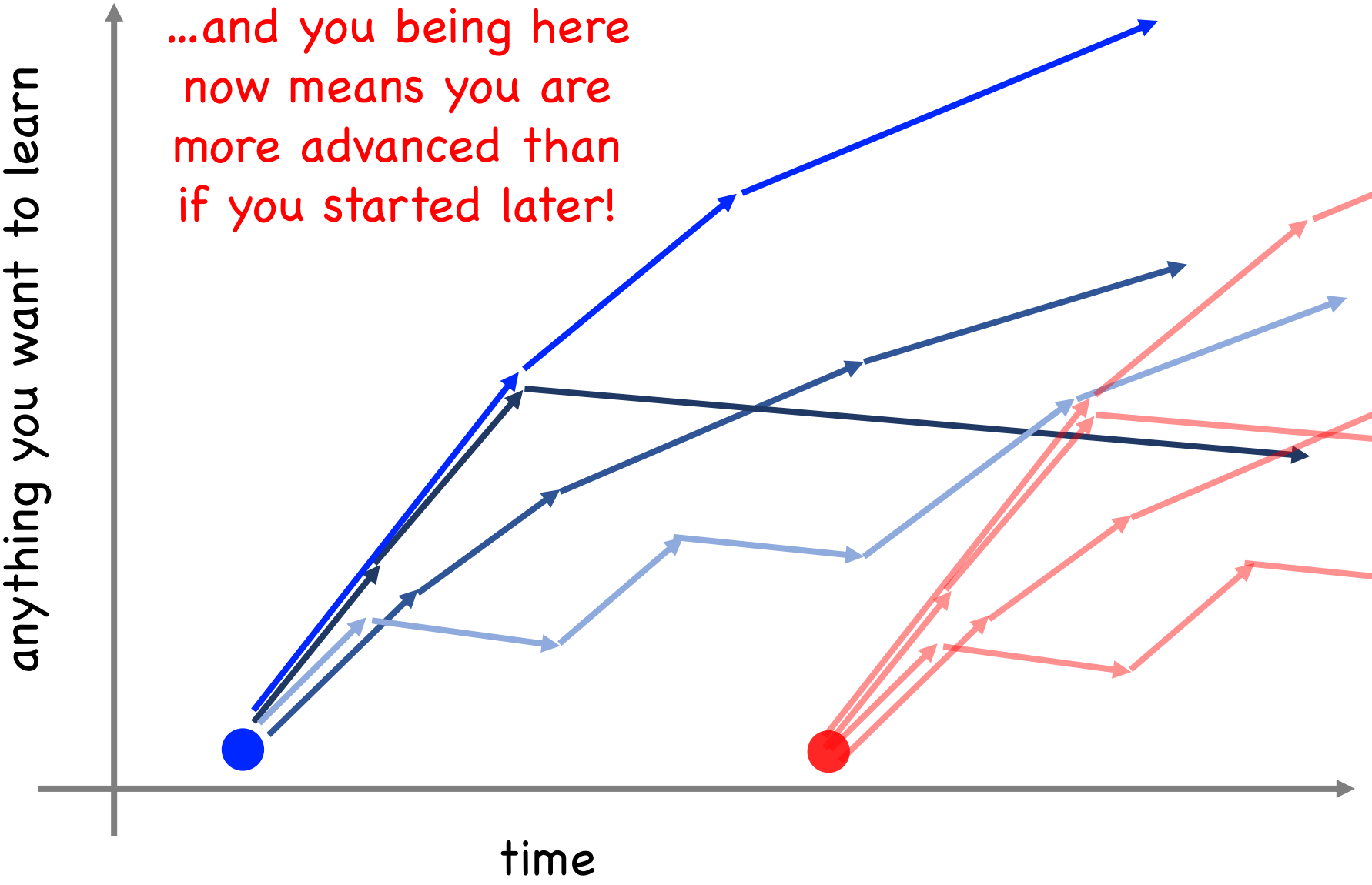
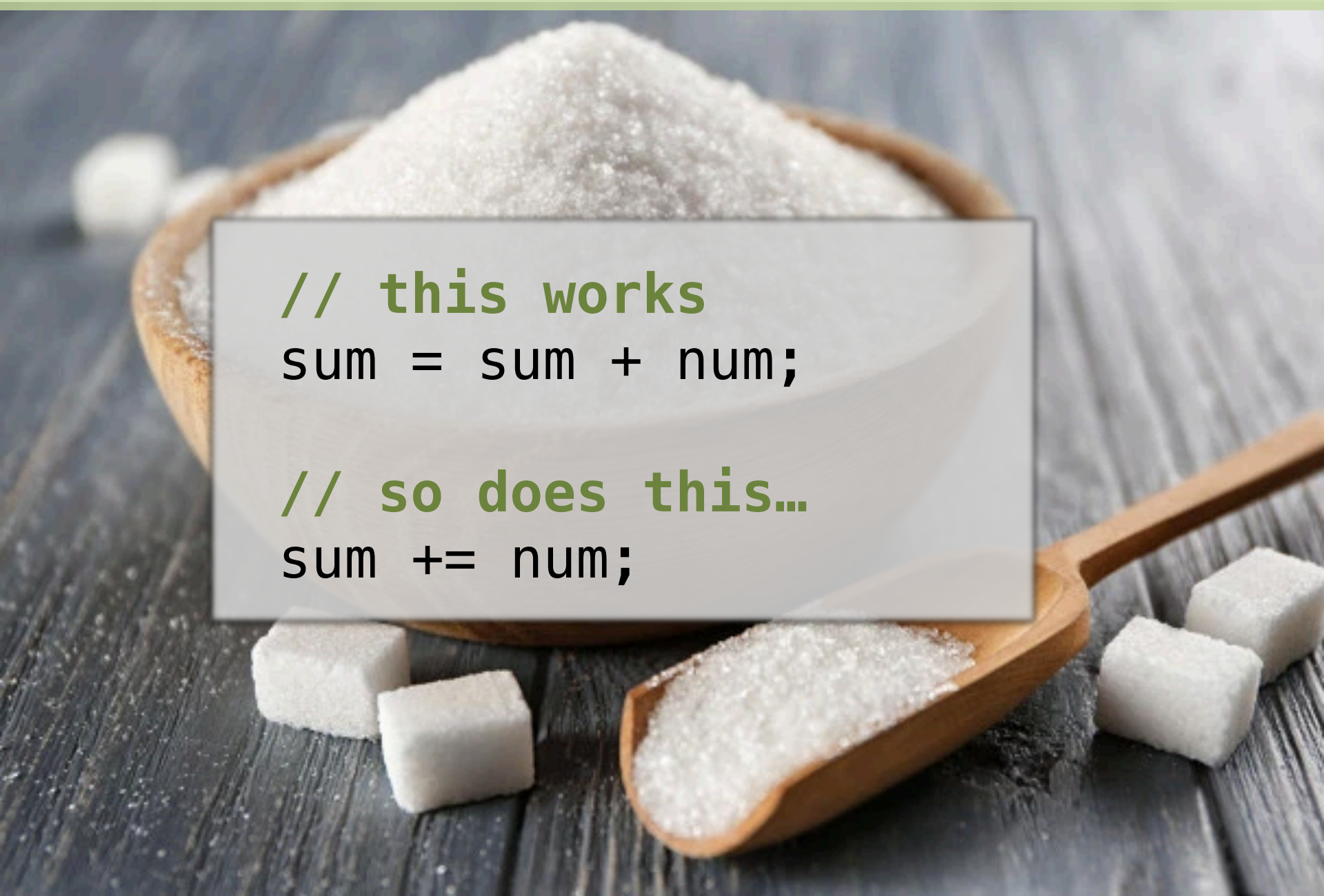


There are many learning paths



If you want to do something difficult, what's important is how much you learn each day, not how much you know when you are 17.

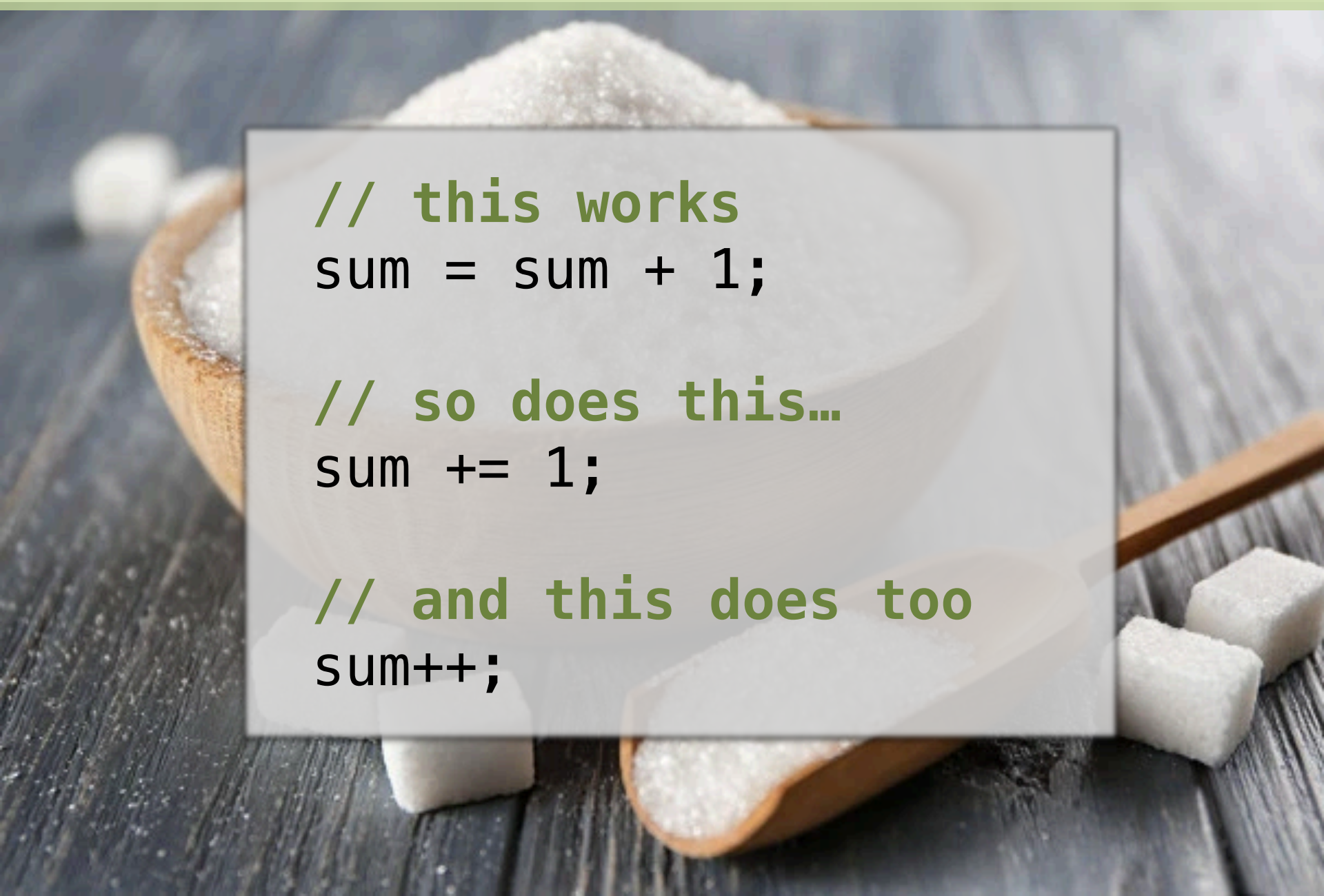
Some syntax



```
// this works
sum = sum + num;

// so does this…
sum += num;
```

Some syntax

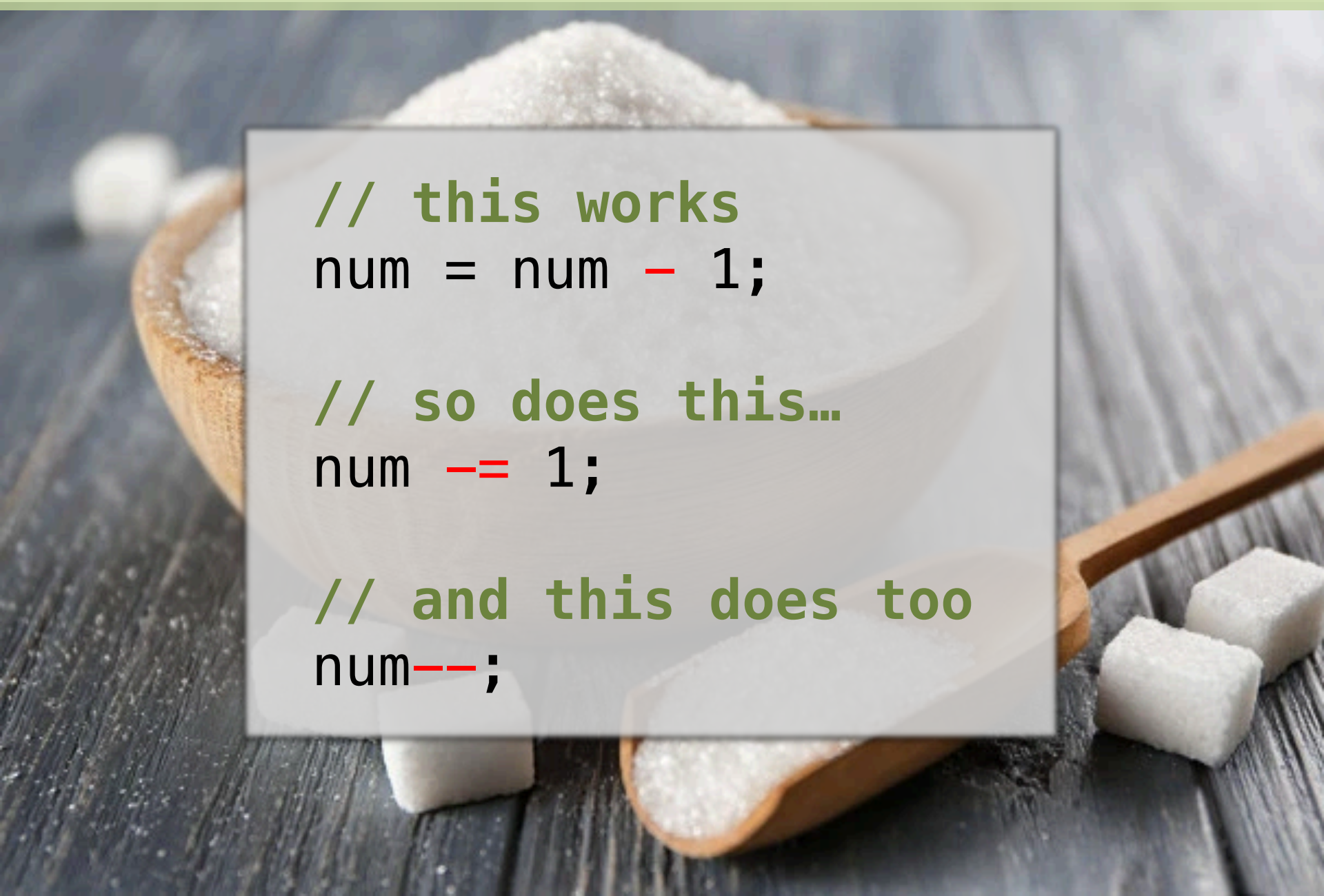


```
// this works
sum = sum + 1;

// so does this…
sum += 1;

// and this does too
sum++;
```

Some syntax



```
// this works
num = num - 1;

// so does this…
num -= 1;

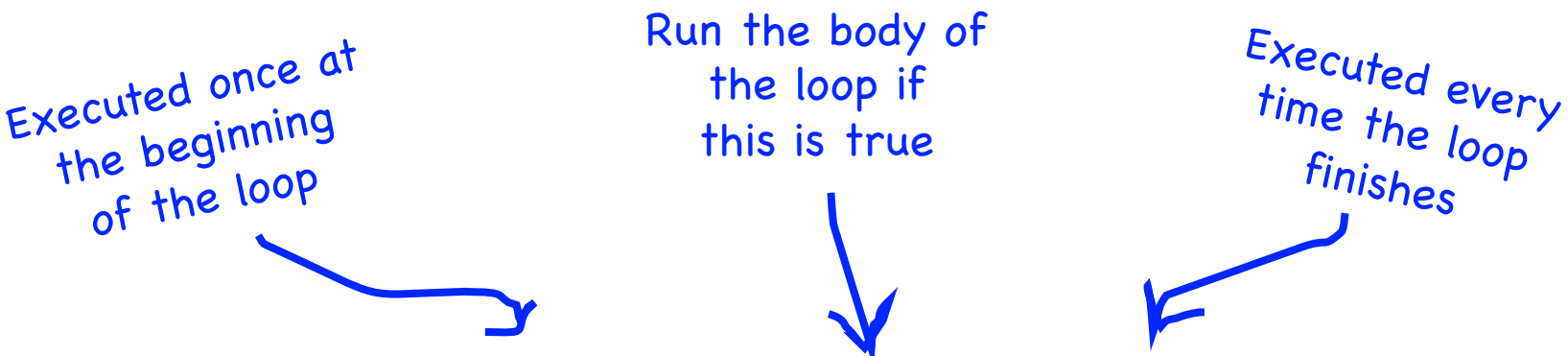
// and this does too
num--;
```

How do you print “Czech this out!” 100 times?

For loop

```
public void run() {
   for(int i = 0; i < 100; i++) {
      println("Czech this out!");
   }
}
```

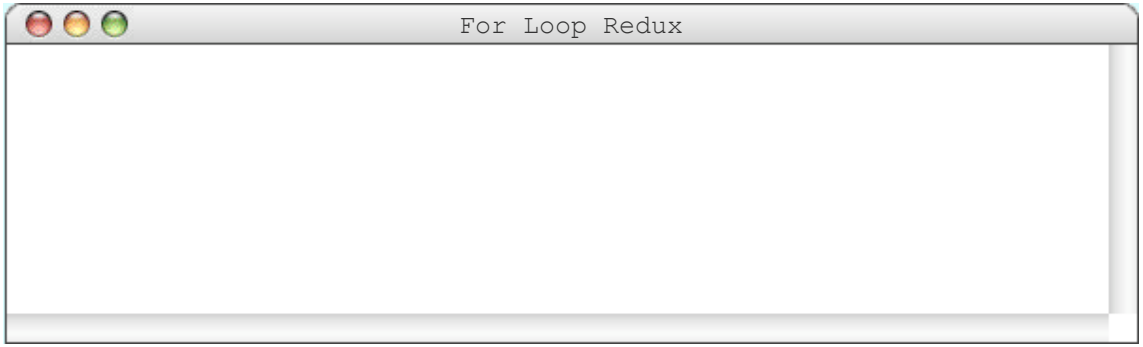
For loop




```
for(int i = 0; i < 100; i++) {
   println("Czech this out!");
}
```

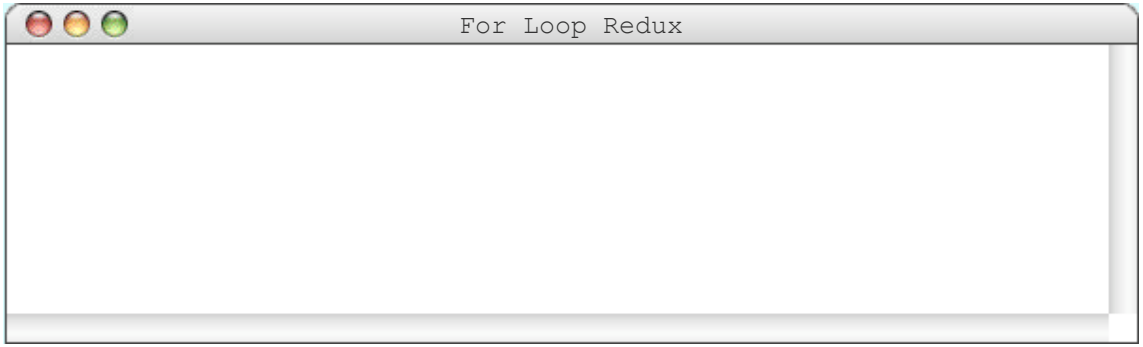
For loop

```
for(int i = 0; i < 3; i++) {
   println("Czech this out!");
}
```



For loop

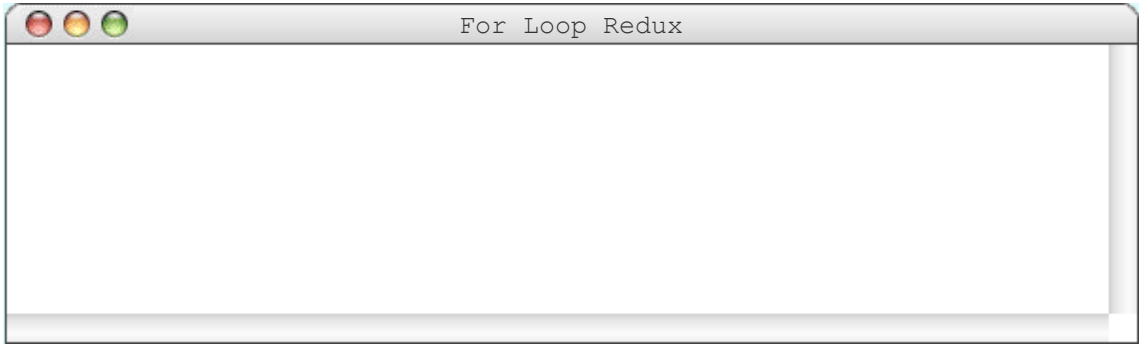
```
for(int i = 0; i < 3; i++) {
    println("Czech this out!");
}
```



For loop

i	0

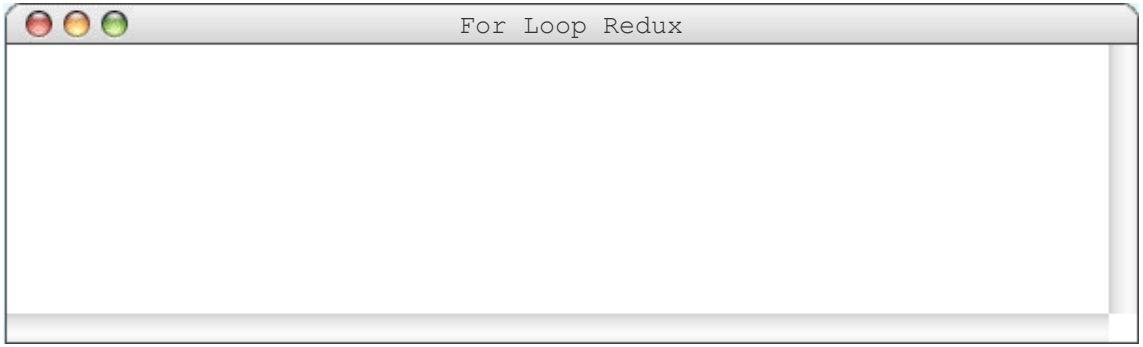
```
for(int i = 0; i < 3; i++) {
   println("Czech this out!");
}
```



For loop

i	0

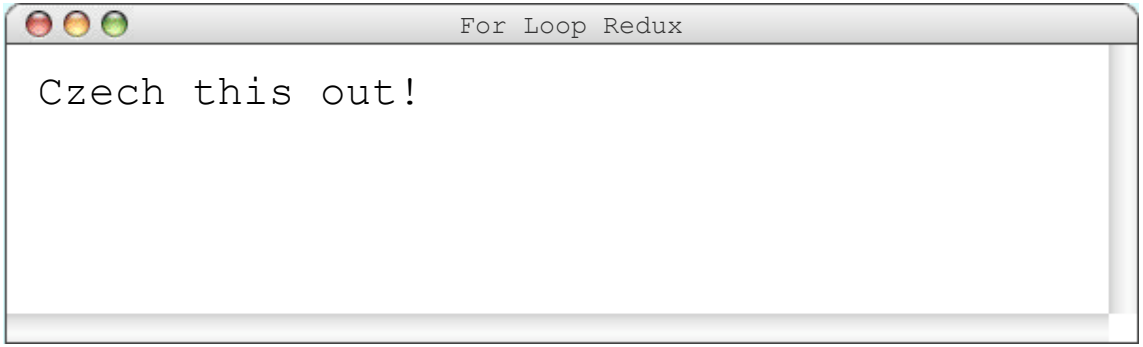
```
for(int i = 0; i < 3; i++) {
   println("Czech this out!");
}
```



For loop

i | 0

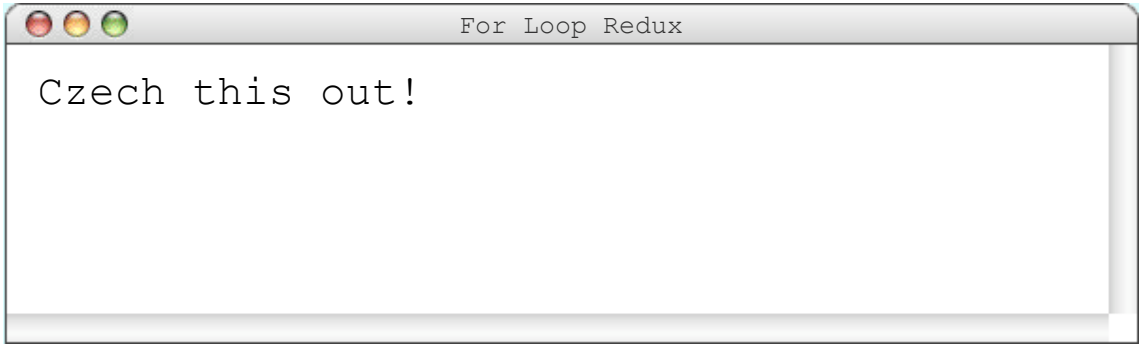
```
for(int i = 0; i < 3; i++) {
   println("Czech this out!");
}
```



For loop

i 1

```
for(int i = 0; i < 3; i++) {
   println("Czech this out!");
}
```



For loop

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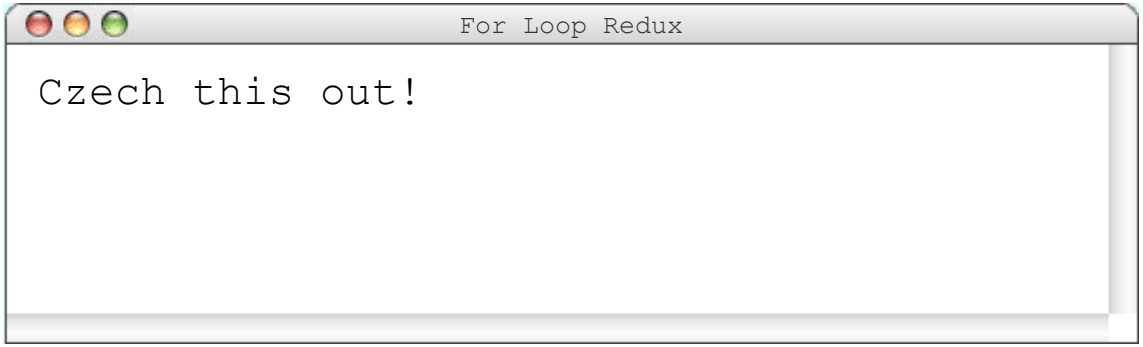
}
```



For loop

i | 1

```
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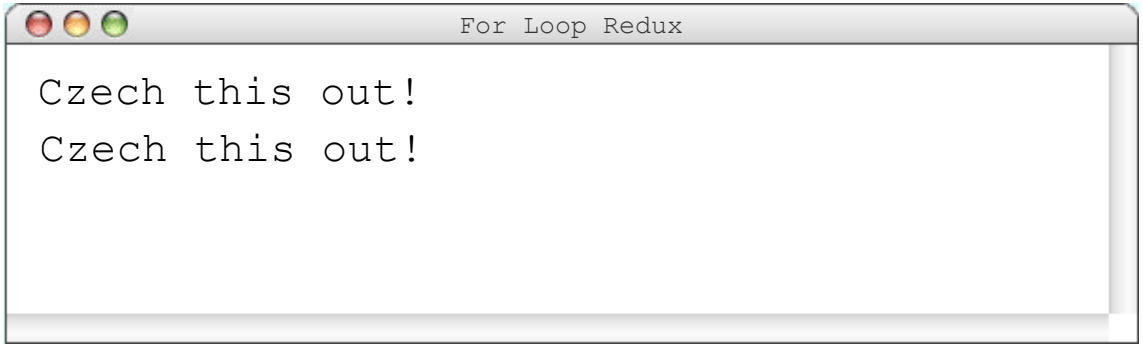
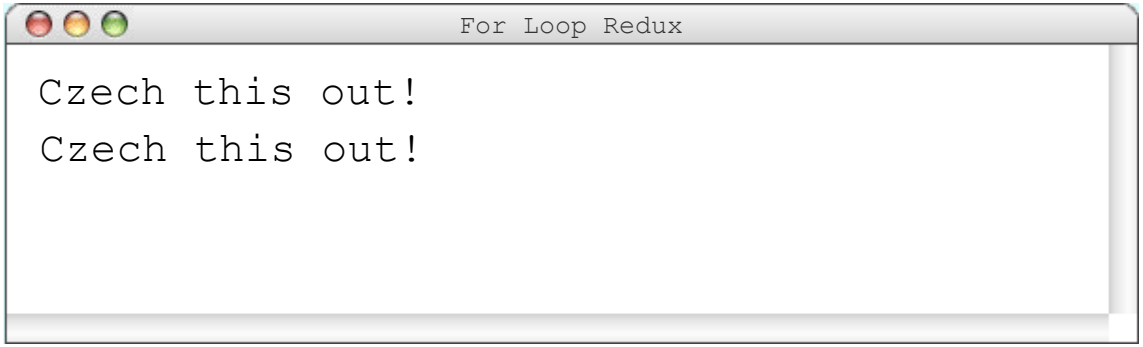
   println("Czech this out!");
}
```



For loop

i	2

```
for(int i = 0; i < 3; i++) {
   println("Czech this out!");
}
```



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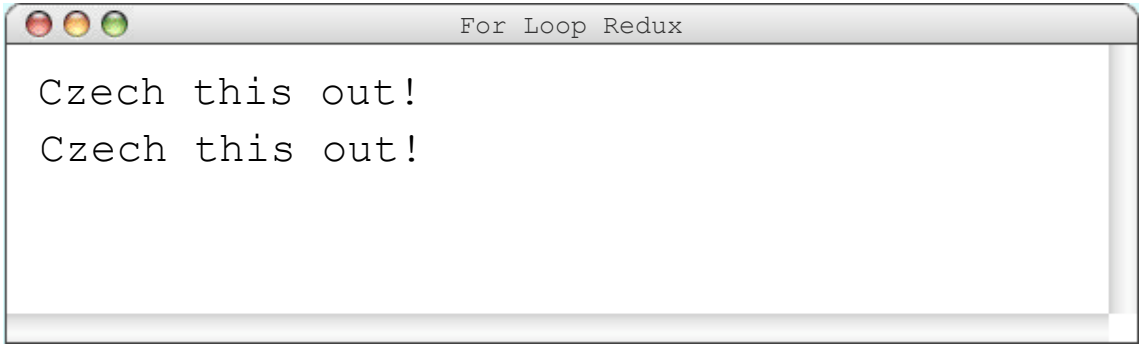

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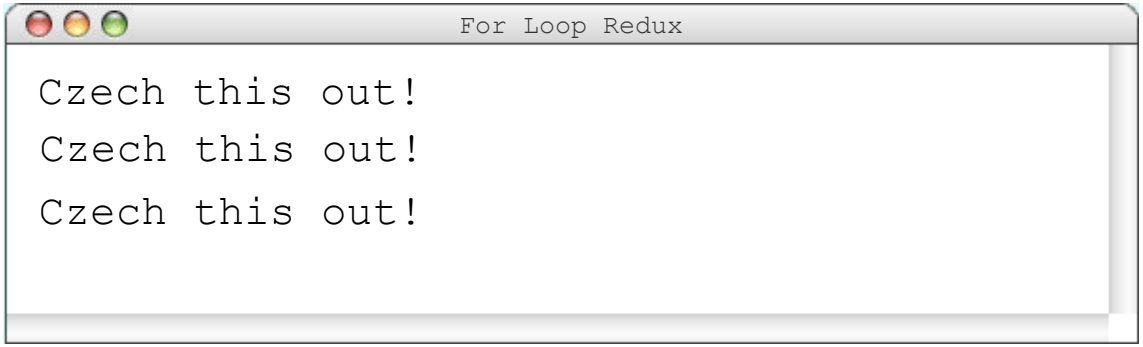
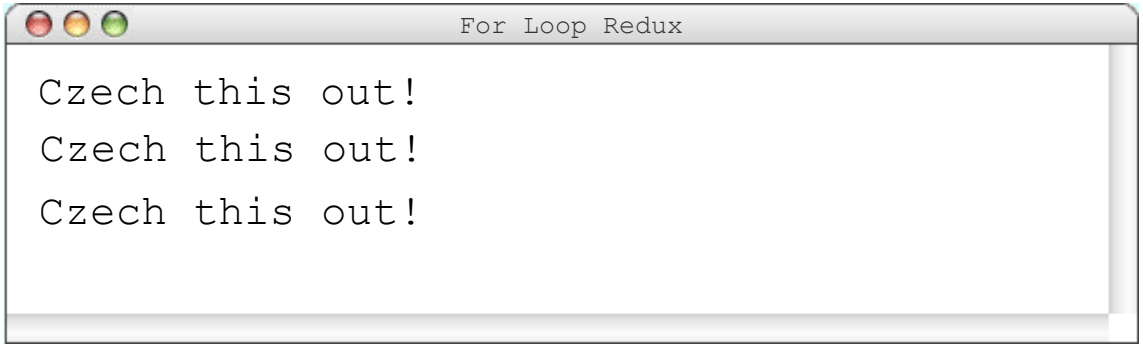


For loop

i	3

```
for(int i = 0; i < 3; i++) {
   println("Czech this out!");
}
```



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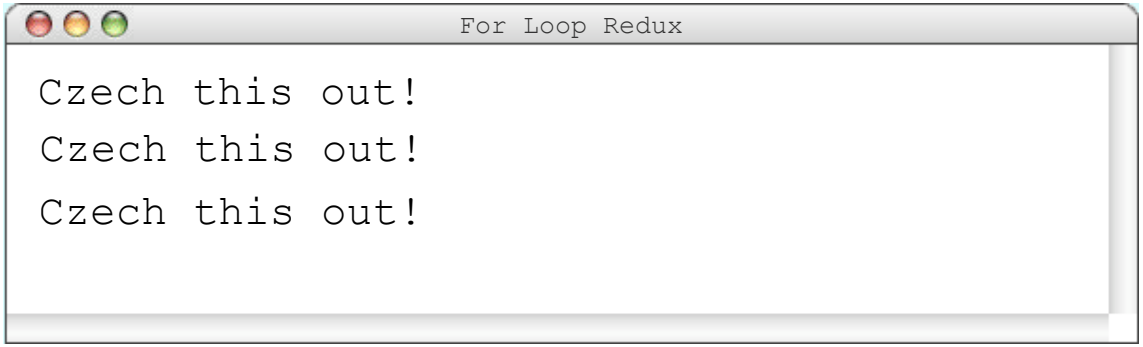
}
```



For loop

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}
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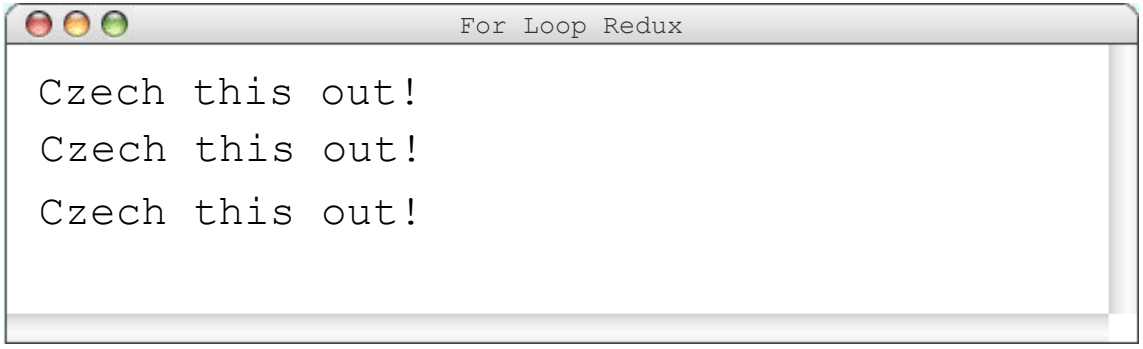
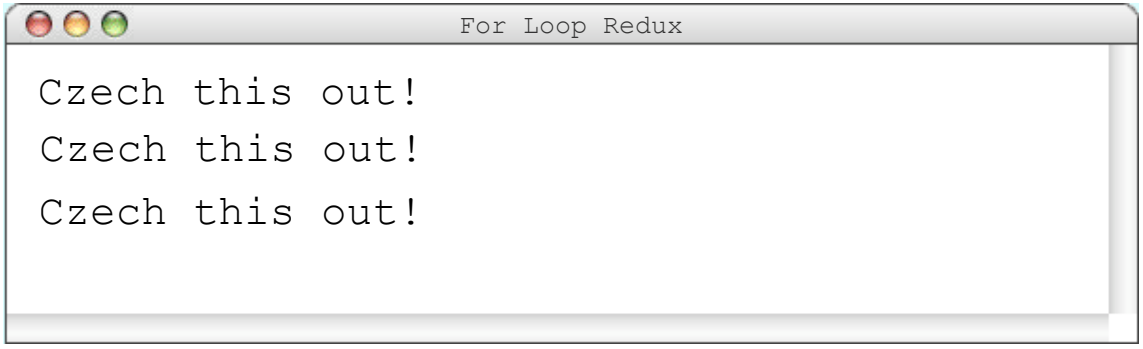


For loop

```
for(int i = 0; i < 3; i++) {
   println("Czech this out!");
}
```

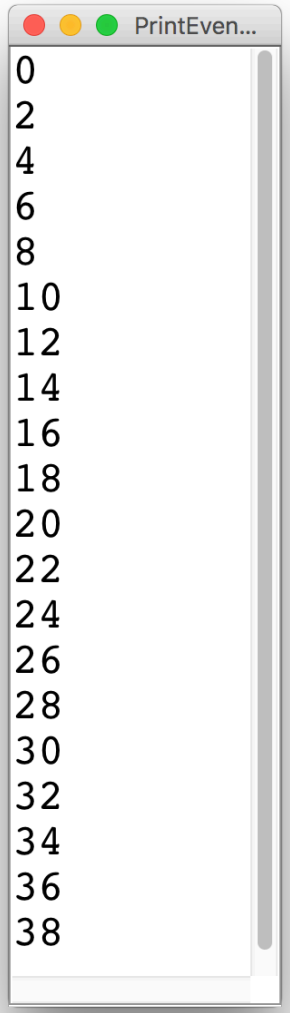


Think for a minute,
then talk to the person next to you:

How would we print the first 100 even numbers?

Use the loop variable!

Printing even numbers

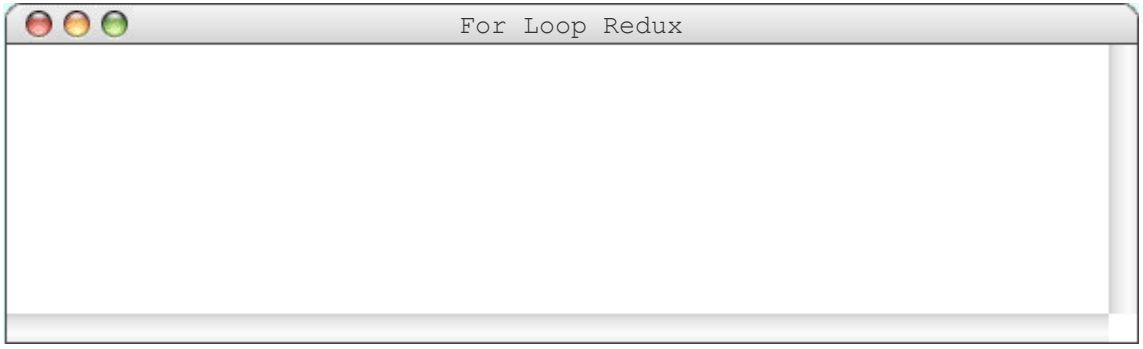


Printing even numbers

```
for(int i = 0; i < NUMS; i++) {
   println(i * 2);
}
```

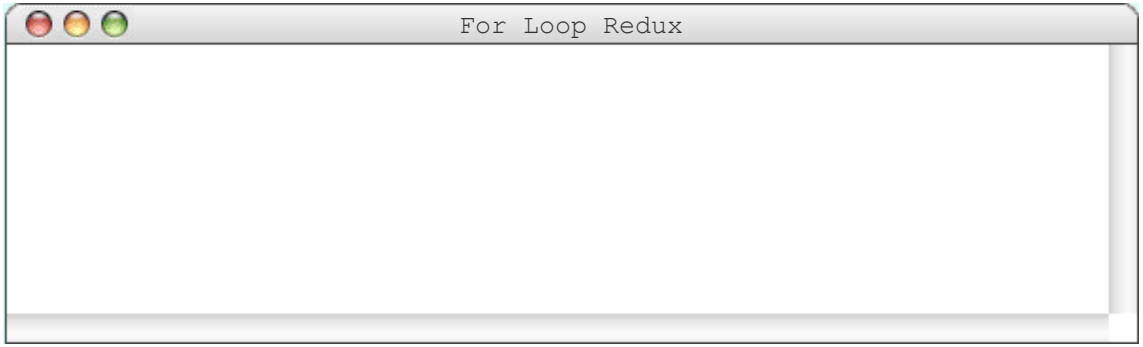
Printing even numbers

```
for(int i = 0; i < 3; i++) {
   println(i * 2);
}
```



Printing even numbers

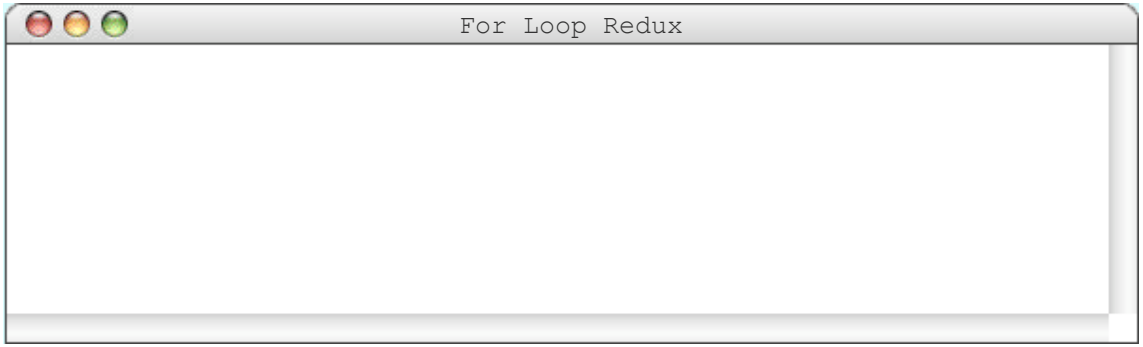
```
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```



Printing even numbers

i	0

```
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```



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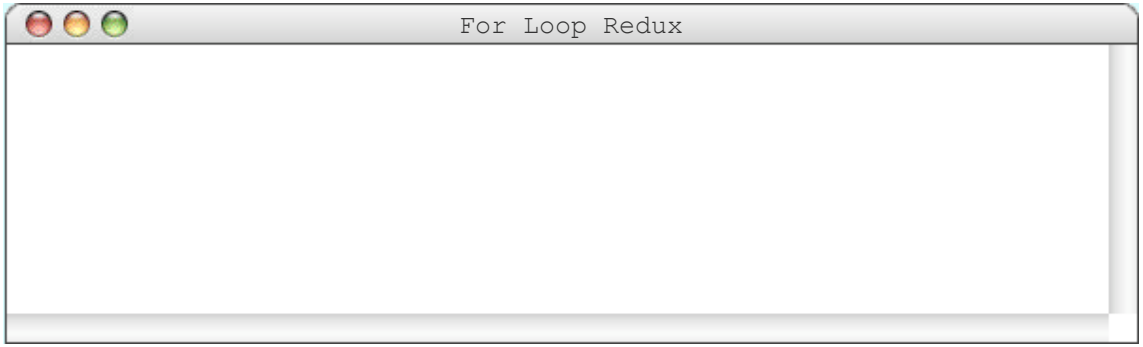

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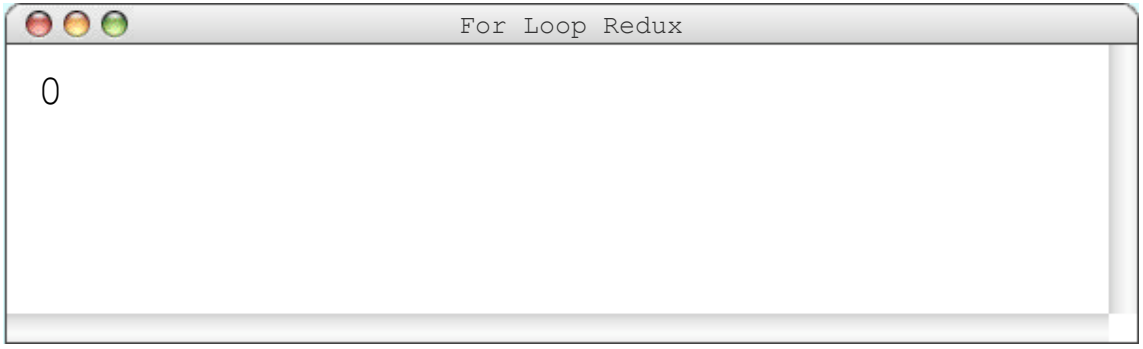
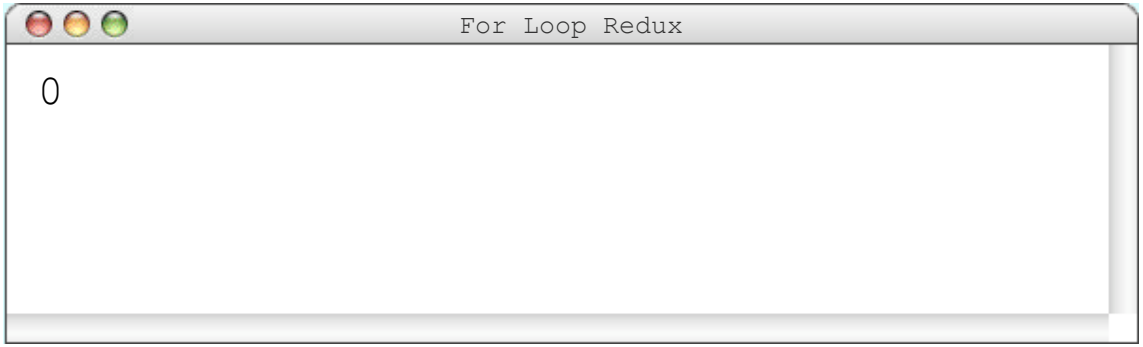


Printing even numbers

i 1

```
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```



Printing even numbers

i	1

```
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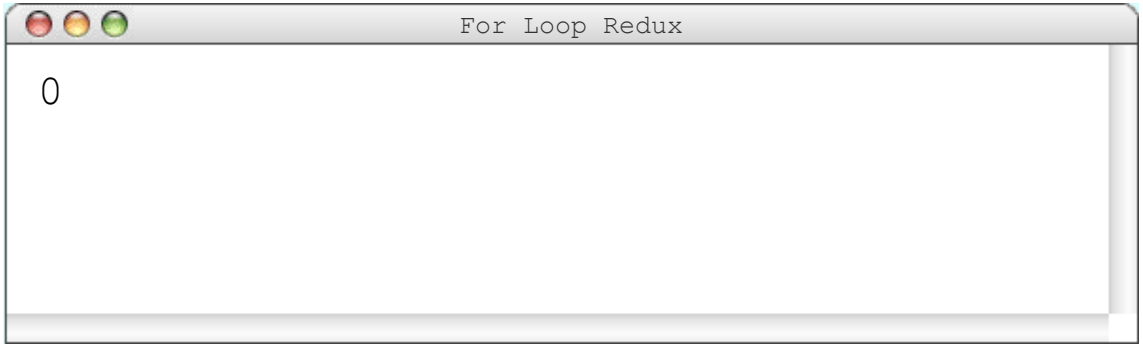
    println(i * 2);
}
```



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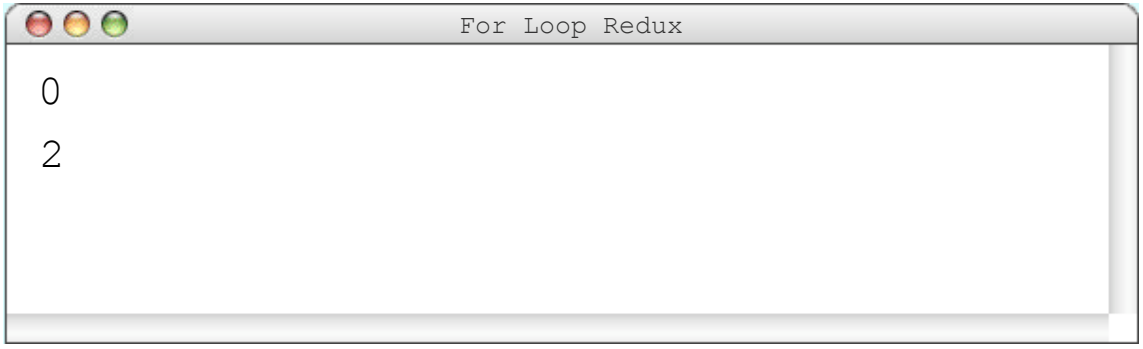

Printing even numbers


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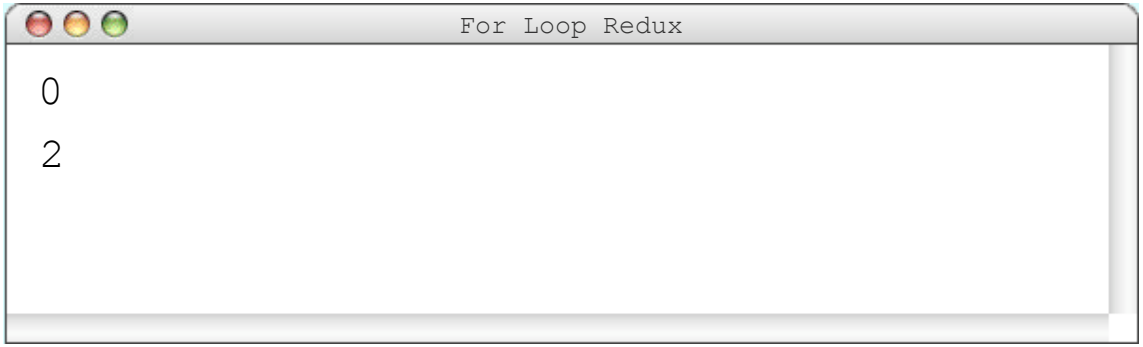
```



Printing even numbers

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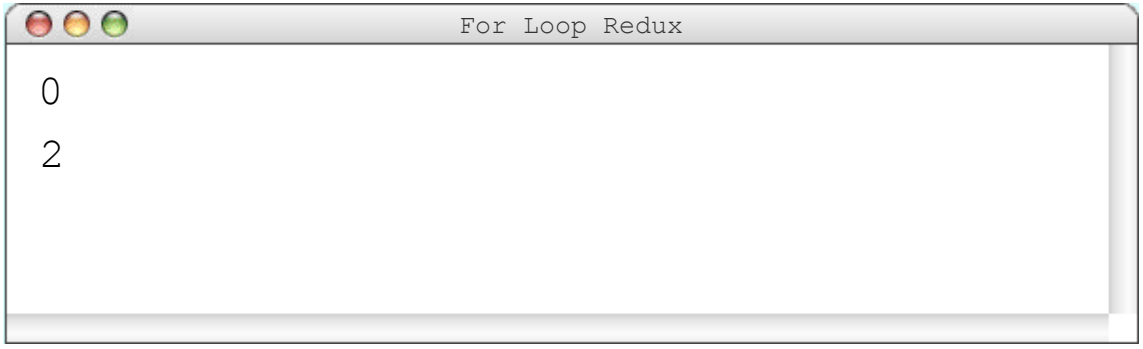

Printing even numbers

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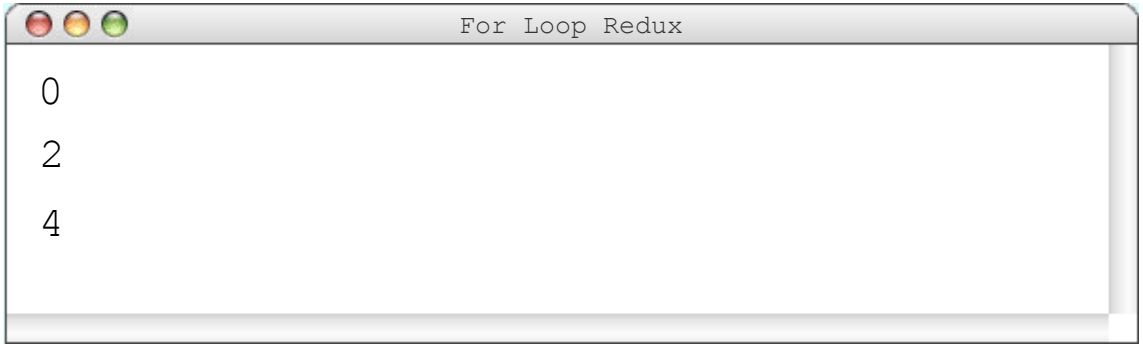

Printing even numbers

i	3

```
for(int i = 0; i < 3; i++) {
    println(i * 2);
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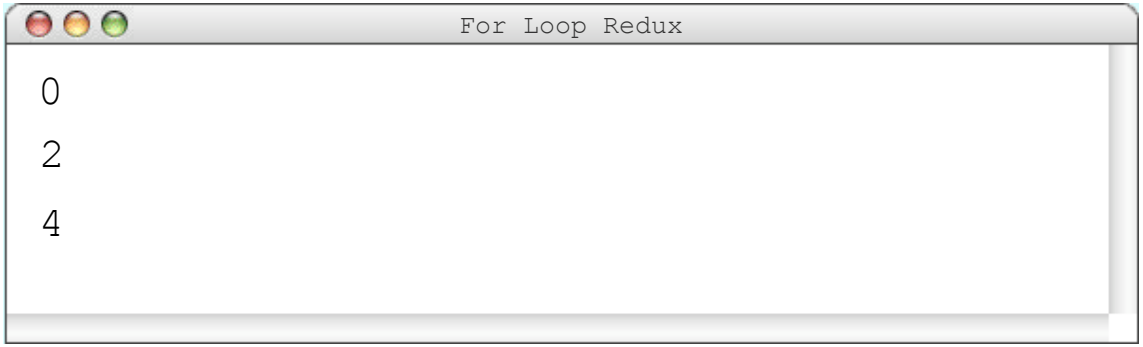
```



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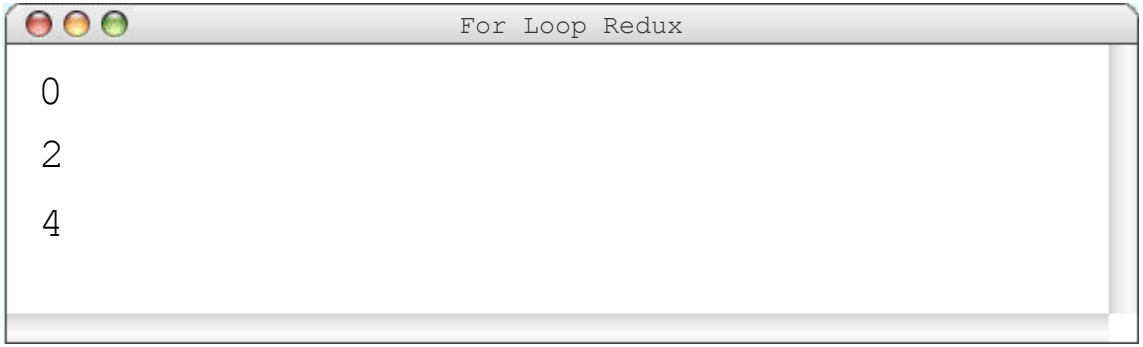

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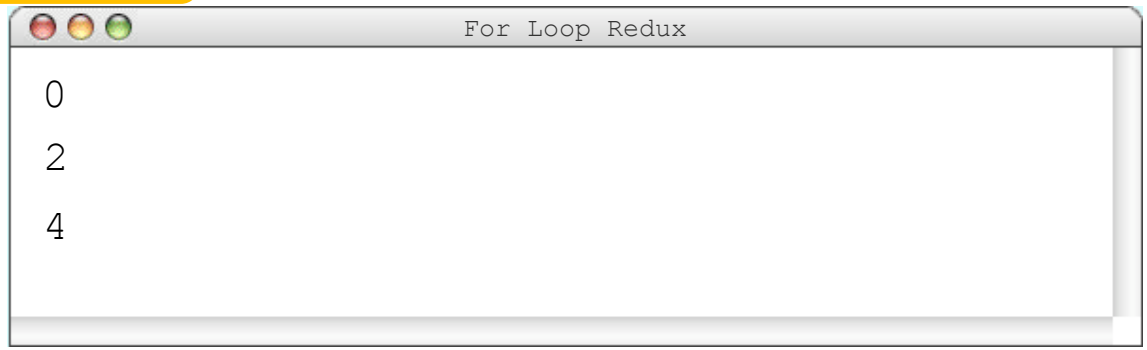
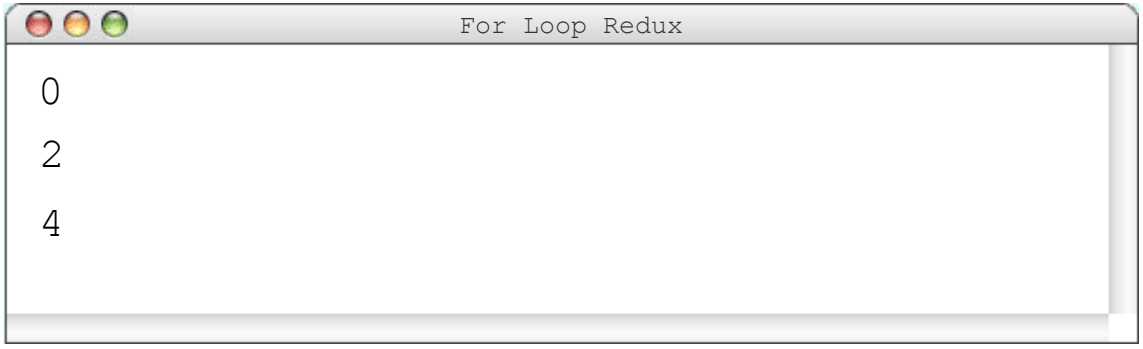
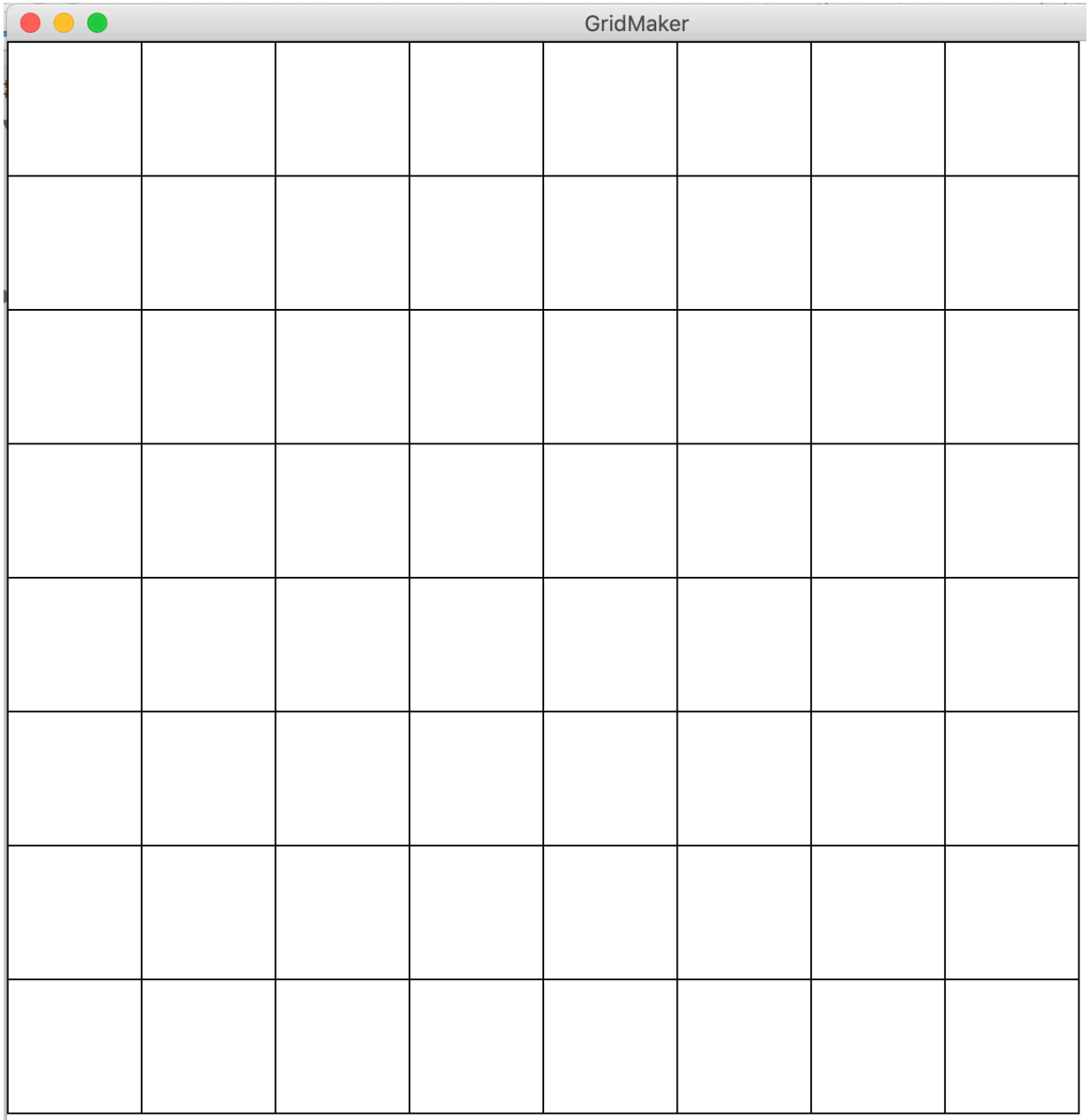


Printing even numbers

```
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```

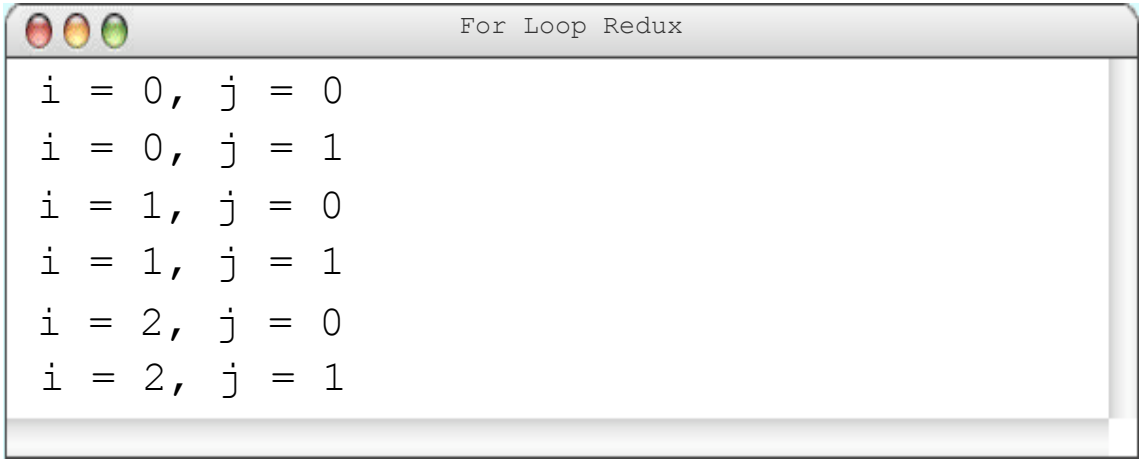


Draw a grid

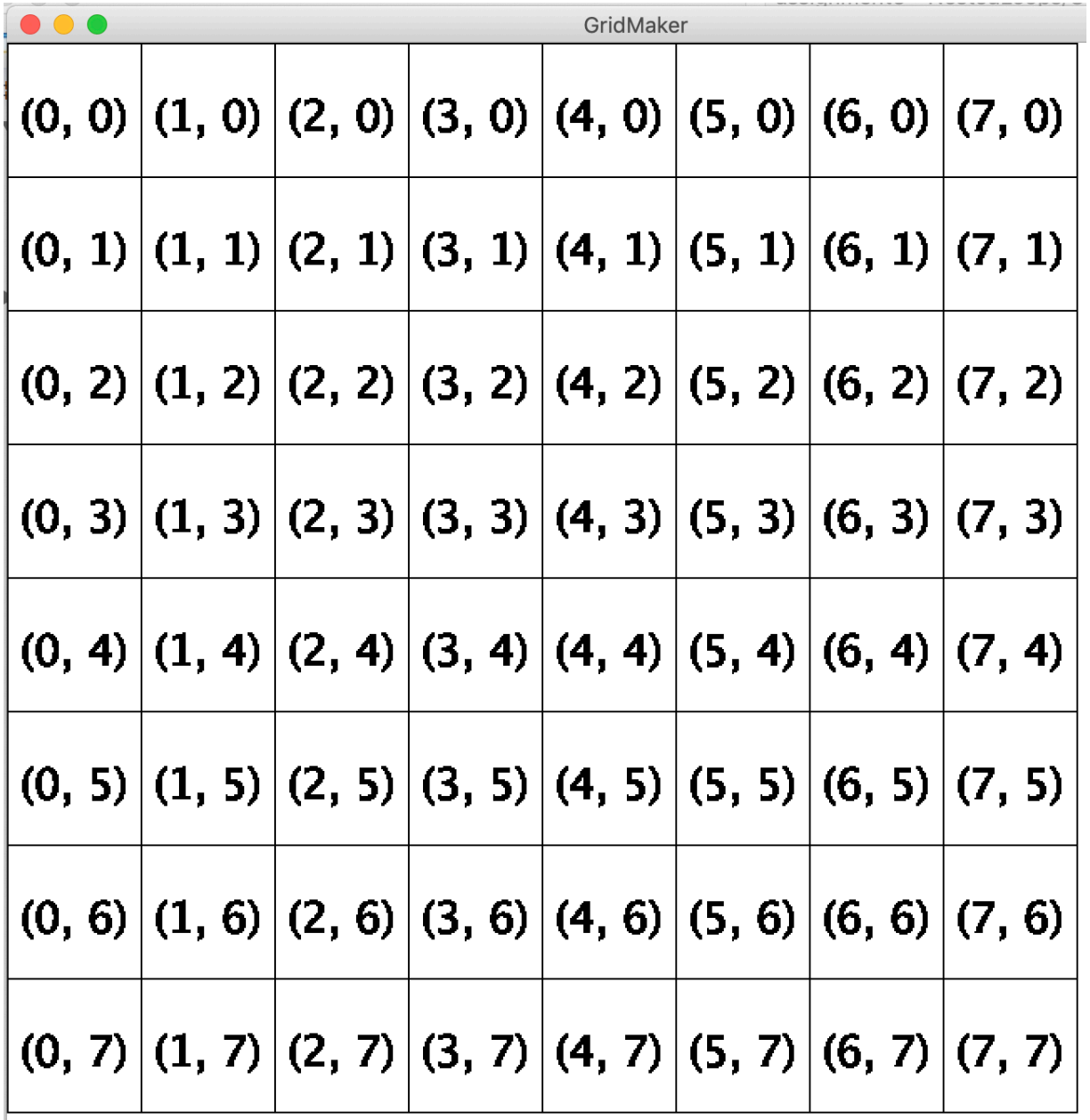


Printing nested for loops

```
for(int i = 0; i < 3; i++) {
   for(int j = 0; j < 2; j++) {
      println("i = " + i + ", j = " + j);
   }
}
```



Draw a grid


GridMaker
(0, 0) (1, 0) (2, 0) (3, 0) (4, 0) (5, 0) (6, 0) (7, 0)
(0, 1) (1, 1) (2, 1) (3, 1) (4, 1) (5, 1) (6, 1) (7, 1)
(0, 2) (1, 2) (2, 2) (3, 2) (4, 2) (5, 2) (6, 2) (7, 2)
(0, 3) (1, 3) (2, 3) (3, 3) (4, 3) (5, 3) (6, 3) (7, 3)
(0, 4) (1, 4) (2, 4) (3, 4) (4, 4) (5, 4) (6, 4) (7, 4)
(0, 5) (1, 5) (2, 5) (3, 5) (4, 5) (5, 5) (6, 5) (7, 5)
(0, 6) (1, 6) (2, 6) (3, 6) (4, 6) (5, 6) (6, 6) (7, 6)
(0, 7) (1, 7) (2, 7) (3, 7) (4, 7) (5, 7) (6, 7) (7, 7)

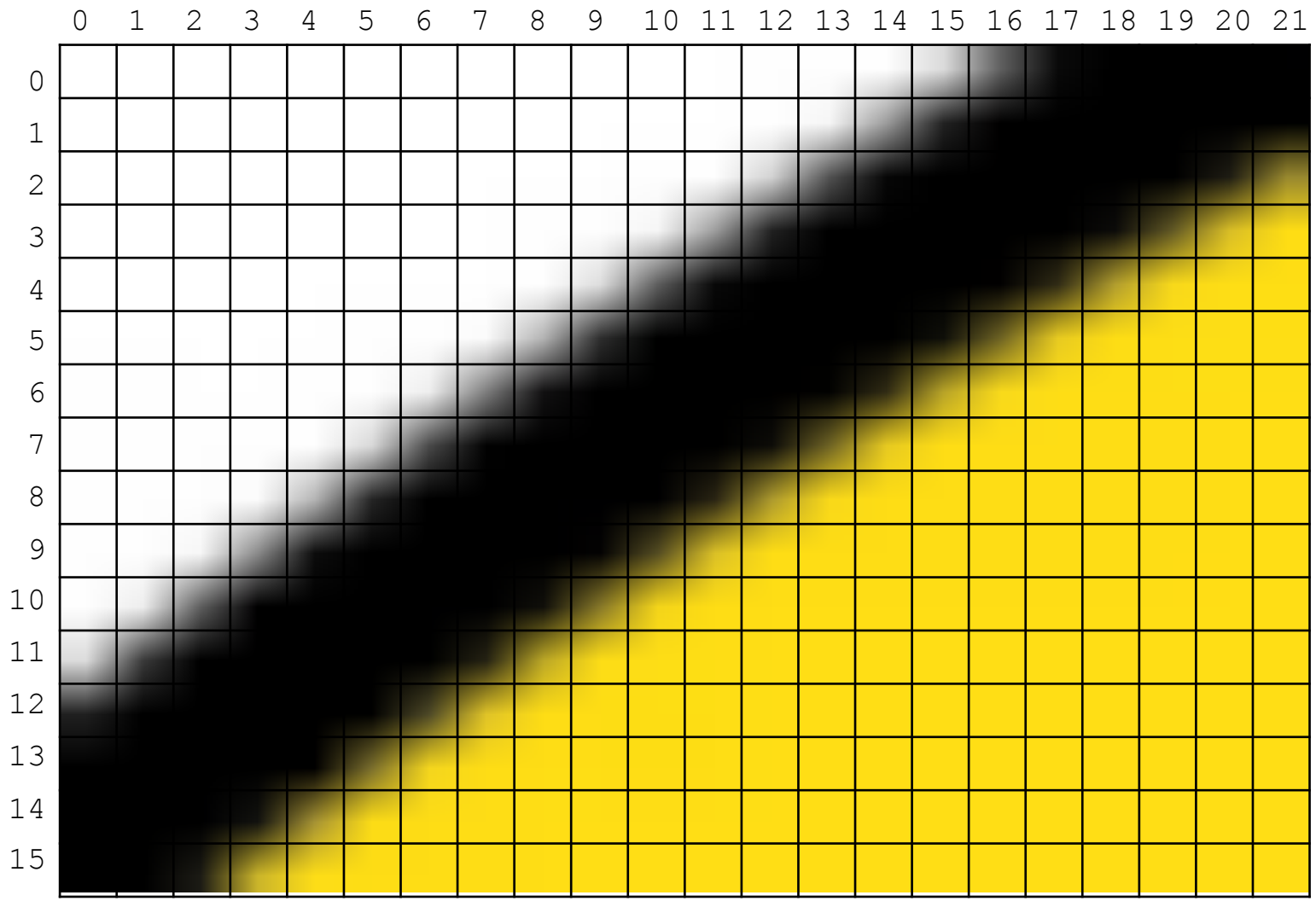
So how does green screen work?

Changing images

Changing images

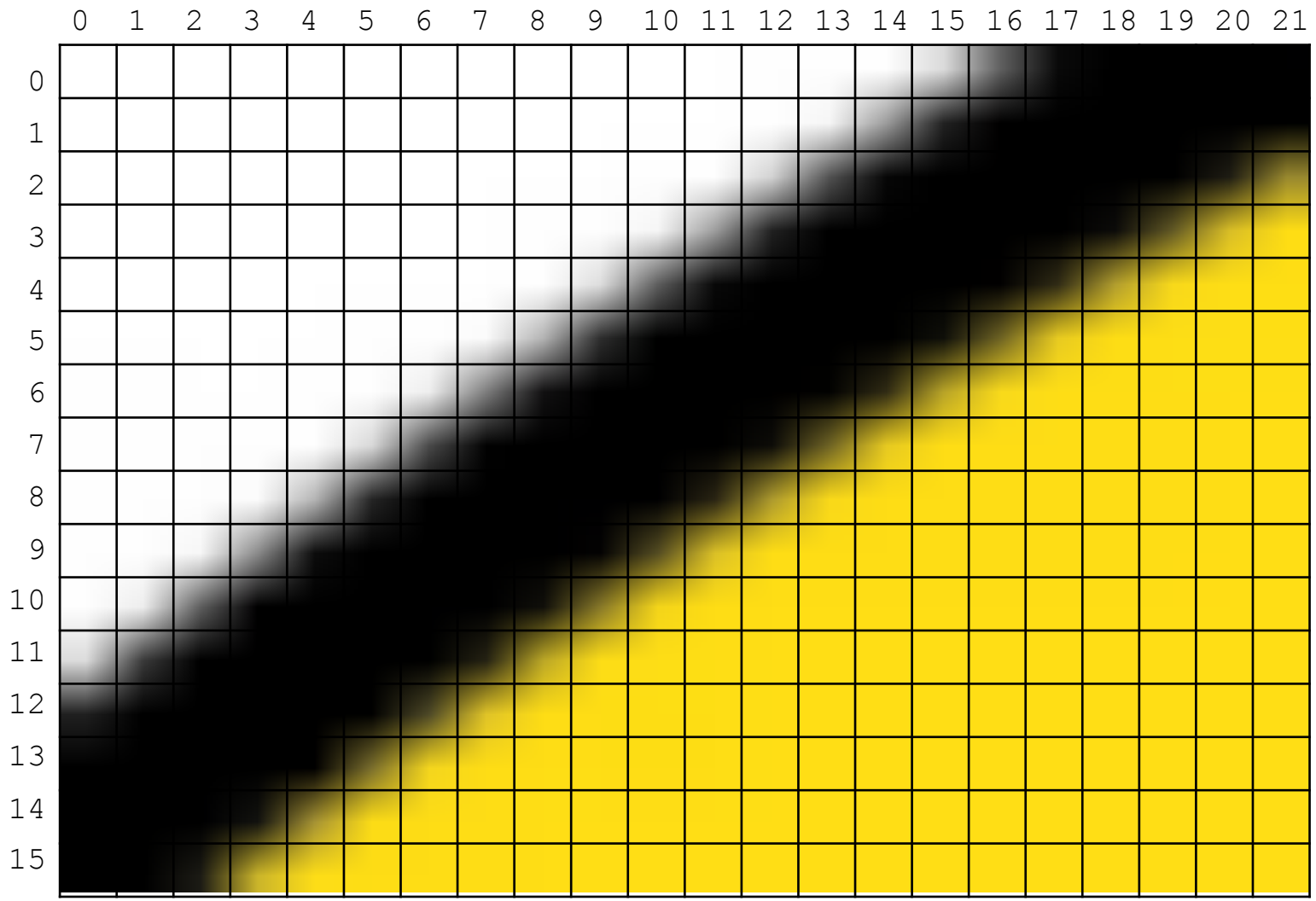
An image is made up of square pixels….

Changing images



… which we can think of as a grid with rows and columns

Changing images



We can look at each pixel like a box in a grid,
and change the ones we want to change!


Přeji vám hezký víkend!