# CS50 for JDs

cs50.harvard.edu/hls

# Assignment 0

- What's the largest value you can represent in binary with just 3 bits? Why?
- What's the largest value you can represent in binary with 8 bits? Why?
- … propose how you could represent both negative and positive values (and zero). … downside …?
- … what, in your own words, is abstraction? And why is it a helpful technique?
- What, in your own words, is an algorithm? How is it different from a program?
- Suppose that the names in a phone book with n names are not alphabetized but randomly ordered instead. In terms of n, what's an upper bound on the number of steps potentially required to search that phone book for some name? Why?
- …

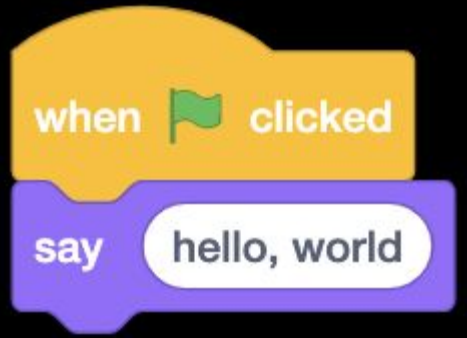
programming languages

wikipedia.org/wiki/List_of_programming_languages

machine code

```
01111111 01000101 01001100 01000110 00000010 00000001 00000001 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000001 00000000 00111110 00000000 00000001 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00101000 00000010 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 01000000 00000000 00000000 00000000
00000000 00000000 01000000 00000000 00001010 00000000 00000001 00000000
01010101 01001000 10001001 11100101 01001000 10000011 11101100 00010000
01001000 10111111 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 10110000 00000000 11101000 00000000 00000000 00000000
00000000 00110001 11001001 10001001 01000101 11111100 10001001 11001000
01001000 10000011 11000100 00010000 01011101 11000011 01101000 01100101
01101100 01101100 01101111 00101100 00100000 01110111 01101111 01110010
01101100 01100100 00001010 00000000 00000000 01100011 01101100 01100001
01101110 01100111 00100000 01110110 01100101 01110010 01110011 01101001
...
```

source code


when clicked
say
hello, world

```c
#include <stdio.h>

int main(void)
{
    printf("hello, world\n");
}
```

```
#include <iostream>

int main()
{
    std::cout << "hello, world" << std::endl;
}
```

```
class Hello
{
    public static void main(String [] args)
    {
        System.out.println("hello, world");
    }
}
```

```
...
main:                                   # @main
        .cfi_startproc
# %bb.0:
        pushq   %rbp
        .cfi_def_cfa_offset 16
        .cfi_offset %rbp, -16
        movq    %rsp, %rbp
        .cfi_def_cfa_register %rbp
        subq    $16, %rsp
        movabsq $.L.str, %rdi
        movb    $0, %al
        callq   printf
        xorl    %ecx, %ecx
        movl    %eax, -4(%rbp)          # 4-byte Spill
        movl    %ecx, %eax
        addq    $16, %rsp
        popq    %rbp
        retq
.Lfunc_end0:
        .size   main, .Lfunc_end0-main
        .cfi_endproc
                                        # -- End function
        .type   .L.str,@object          # @.str
        .section        .rodata.str1.1,"aMS",@progbits,1
.L.str:
        .asciz  "hello, world\n"
        .size   .L.str, 14
...
```

```
print("hello, world")
```

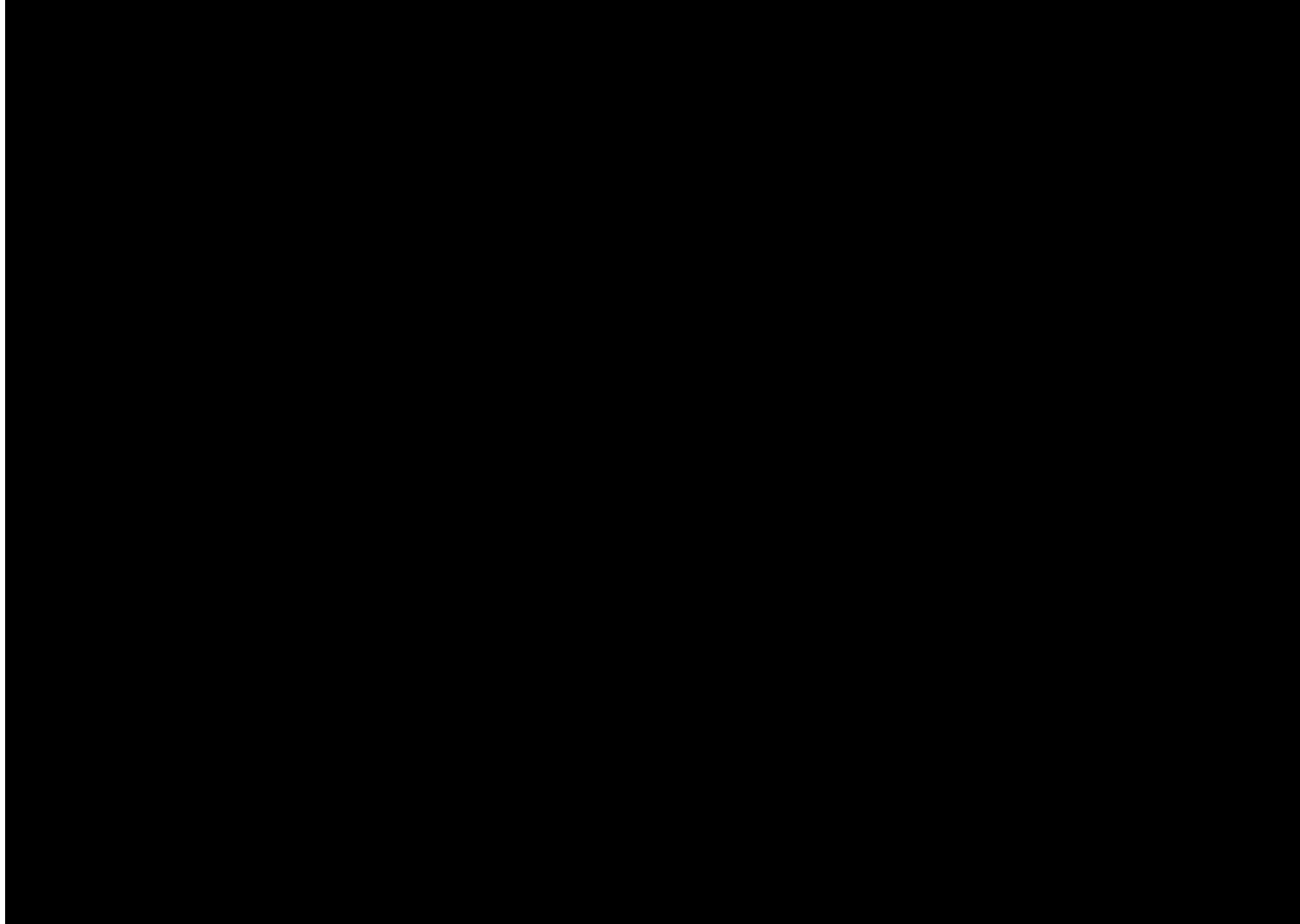
helloworldcollection.de

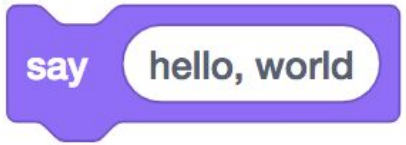
# CS50 IDE

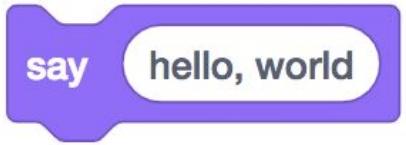
ide.cs50.io

```
python hello.py
```

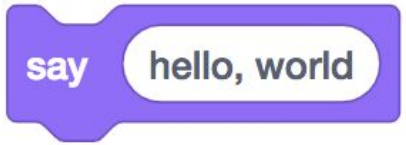
# Python



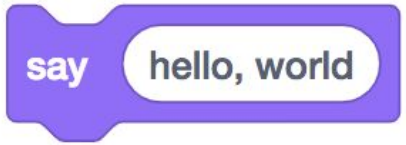

say
hello, world



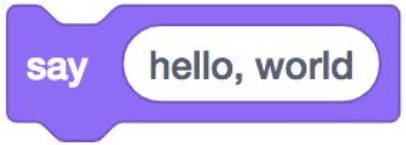

```
print
```



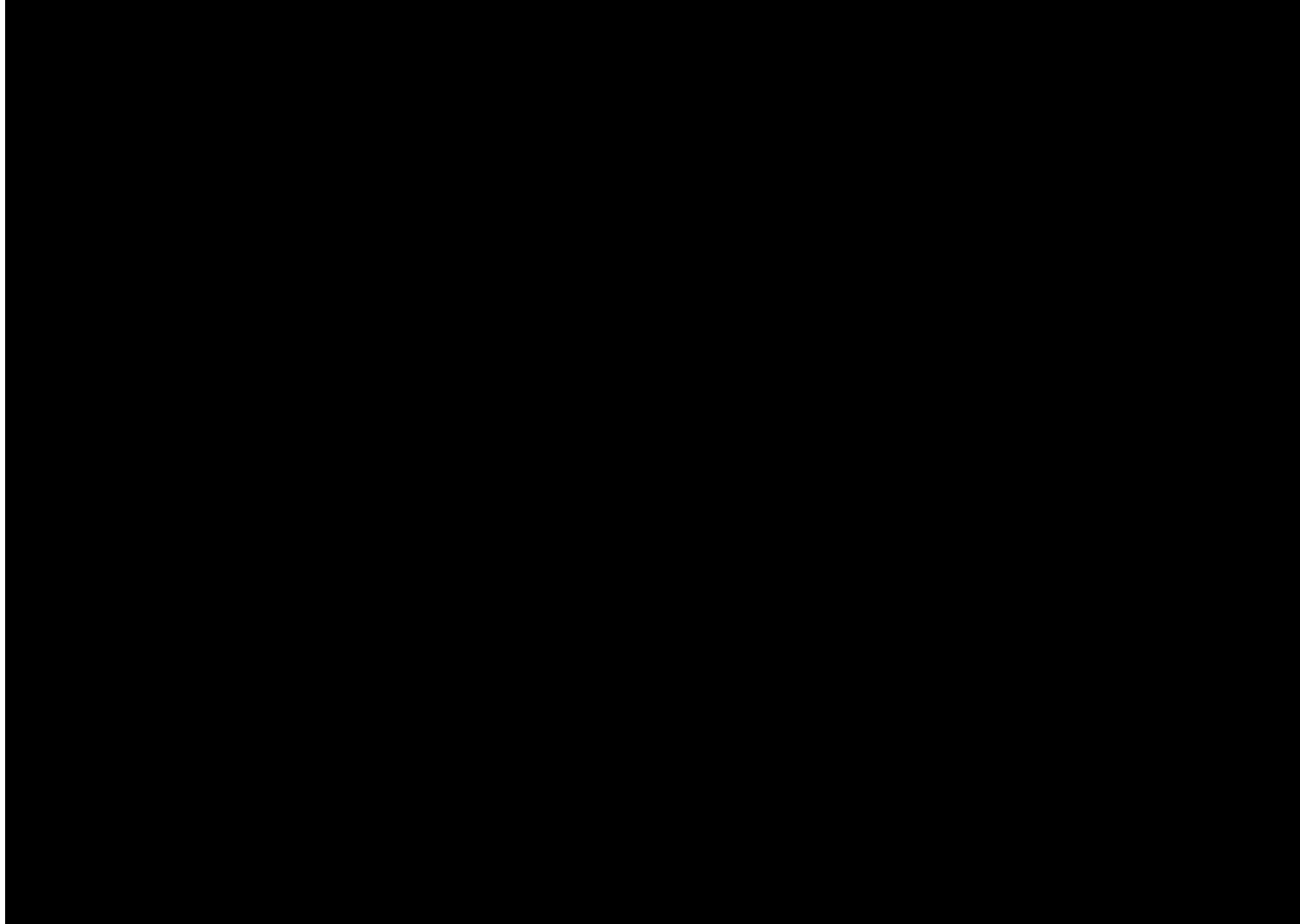

```
print(                )
```




```
print( hello, world )
```

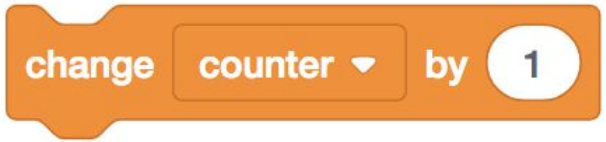


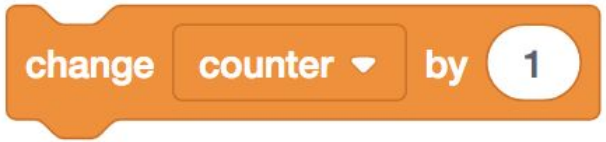

```
print("hello, world")
```



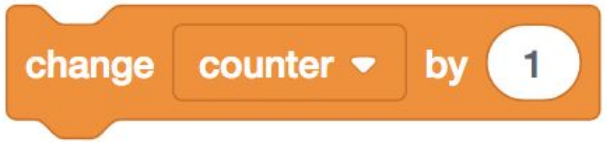

set
counter
to
0


```
counter = 0
```

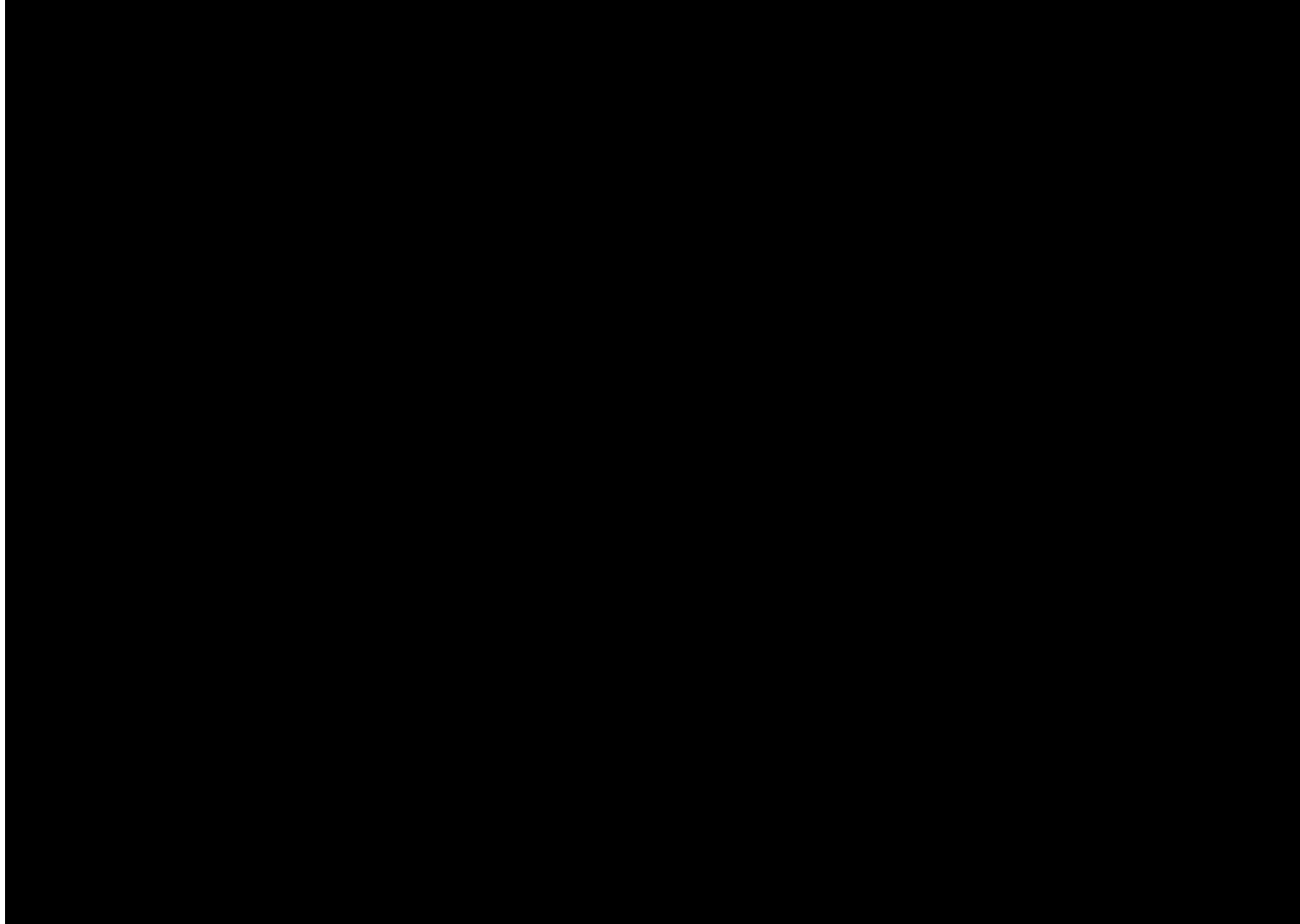

change
counter
by
1




```
counter = counter + 1
```

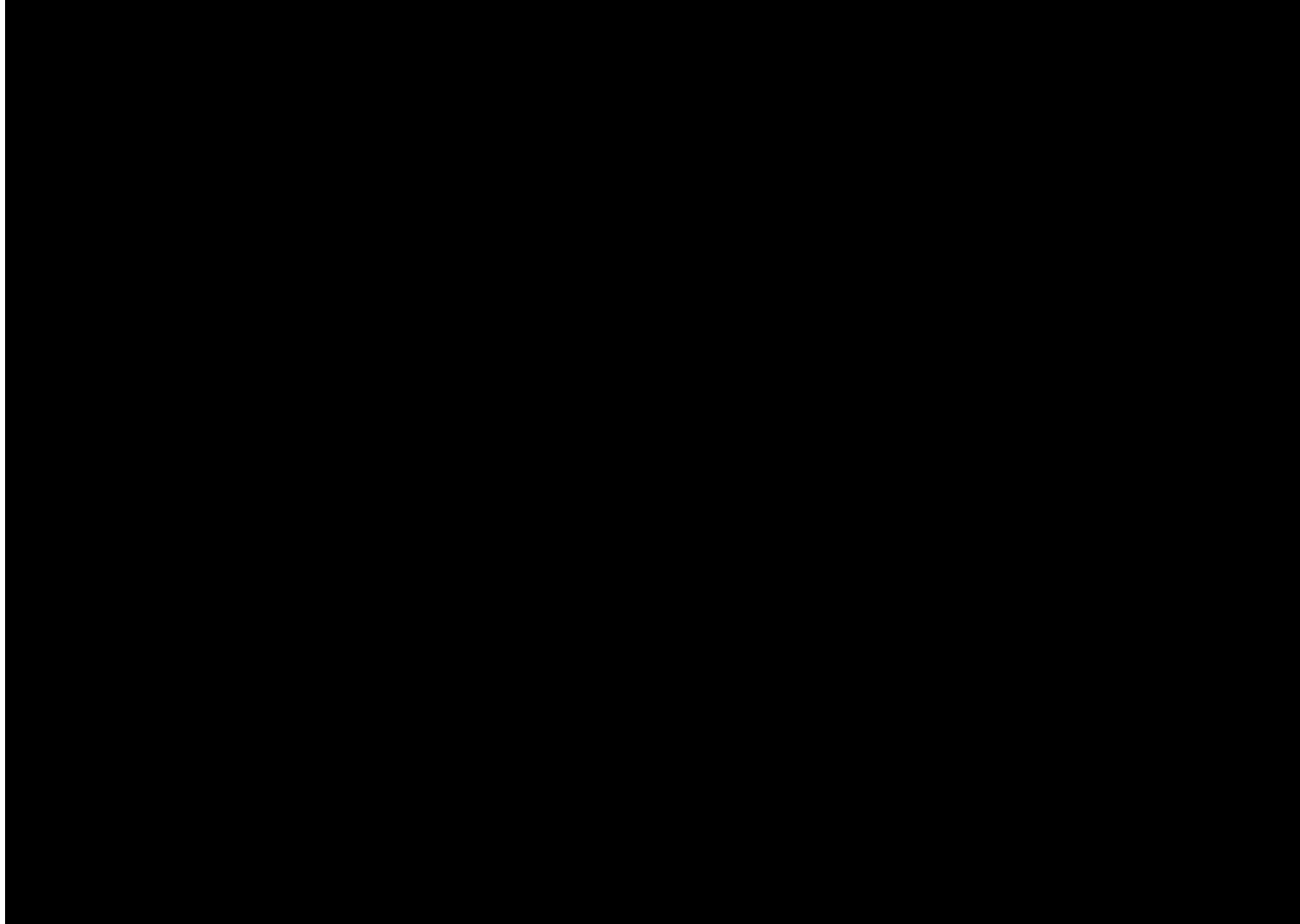


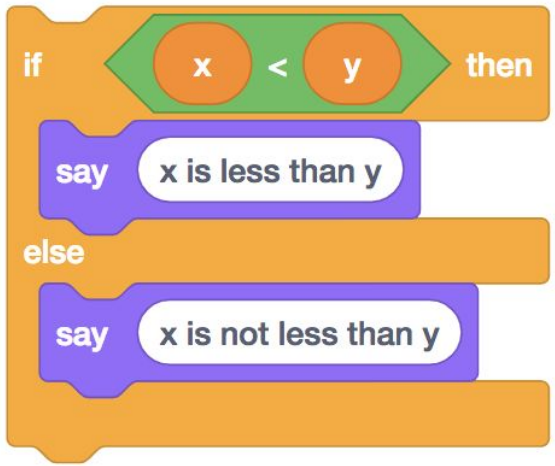

```
counter += 1
```

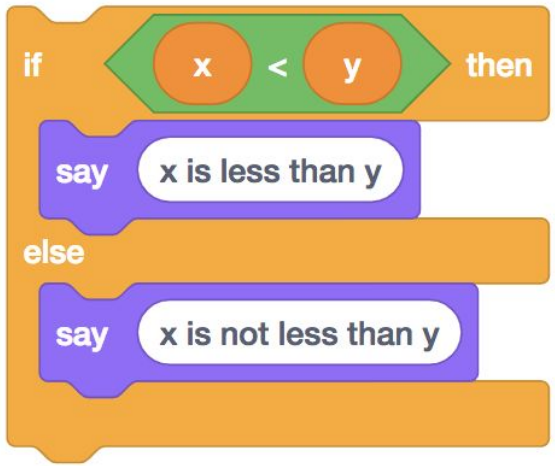



if
x
<
y
then
say
x is less than y

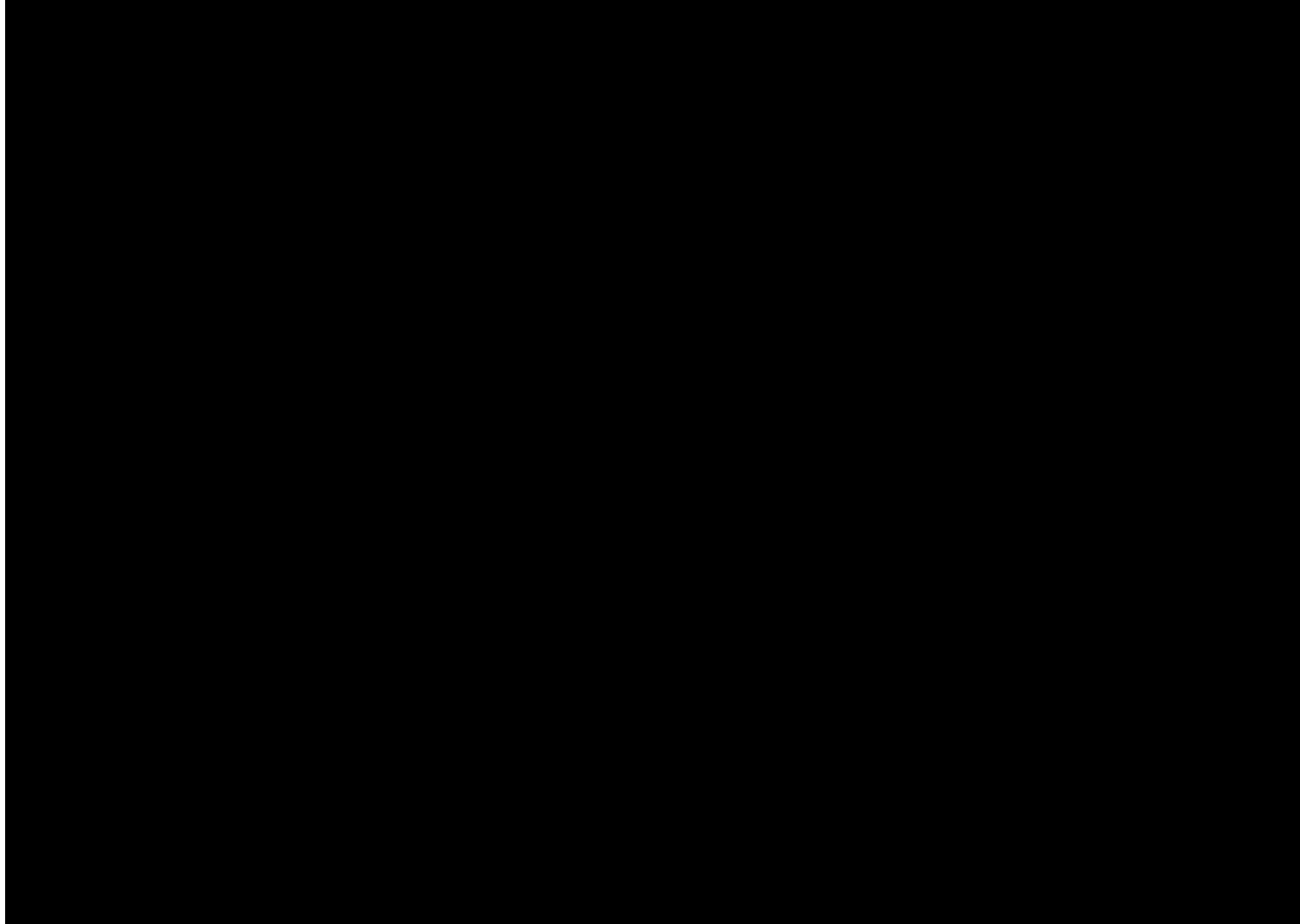

```
if x < y:
    print("x is less than y")
```

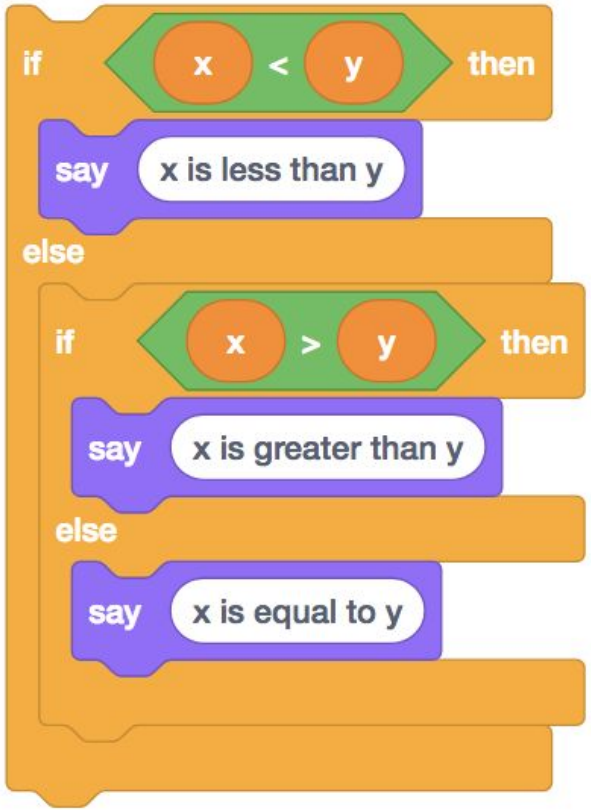


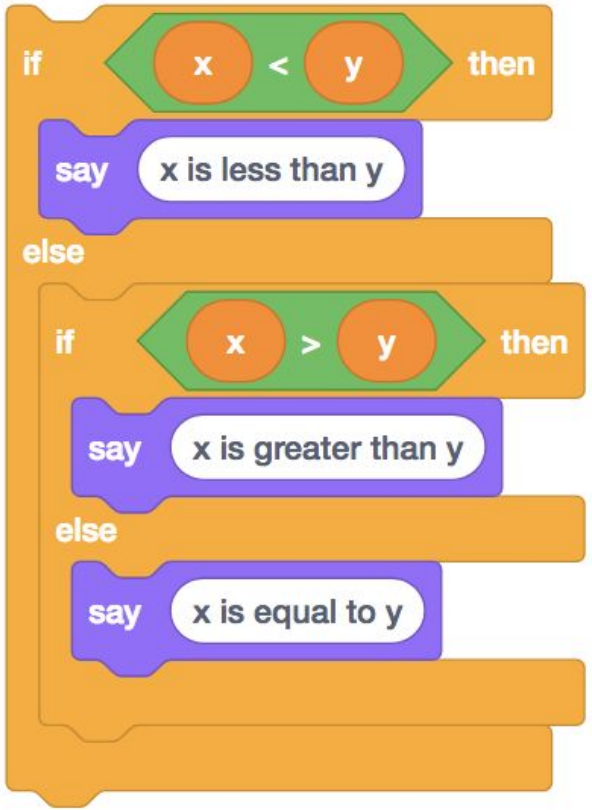

if
x
<
y
then
say
x is less than y
else
say
x is not less than y



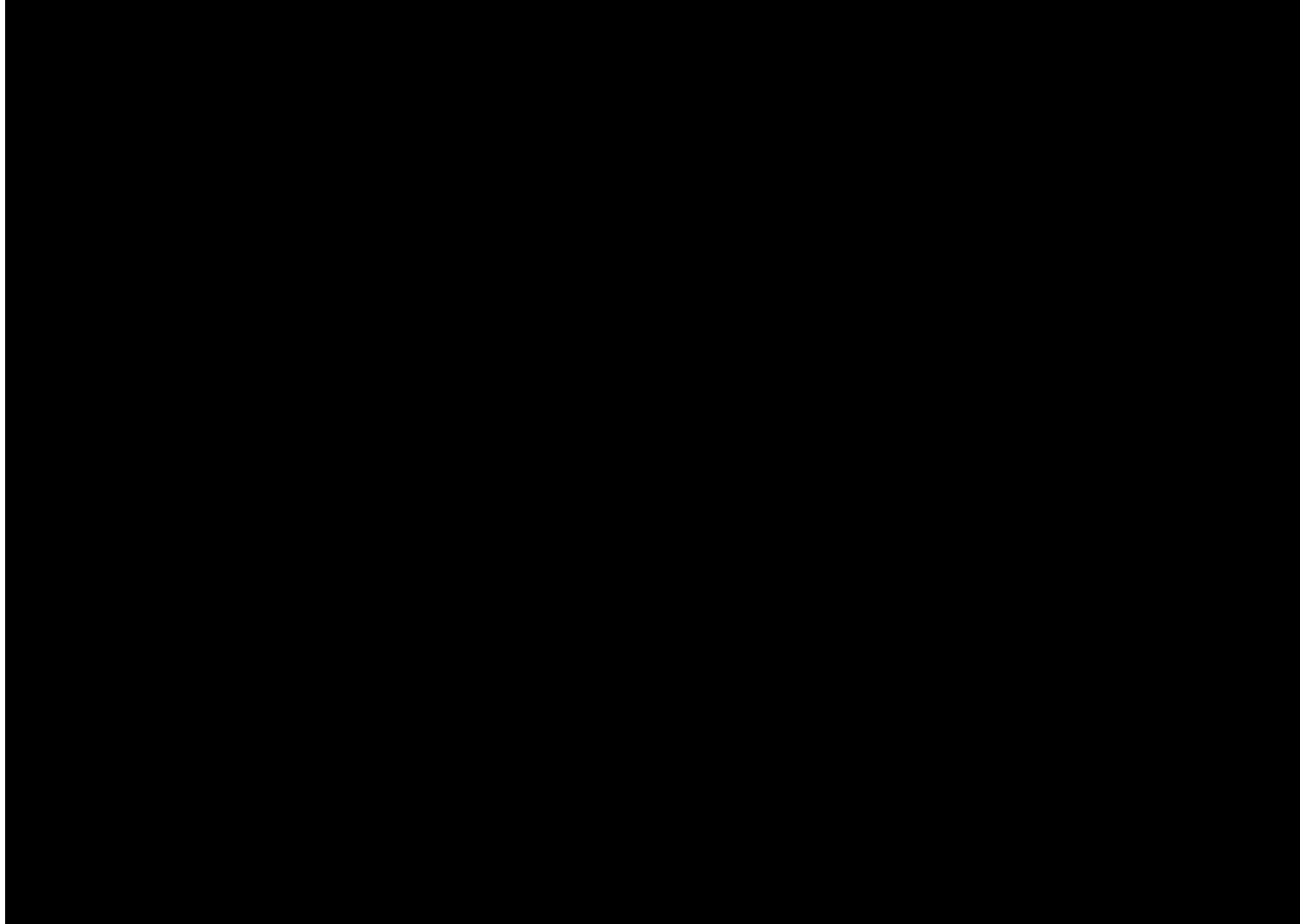

```
if x < y:
    print("x is less than y")
else:
    print("x is not less than y")
```

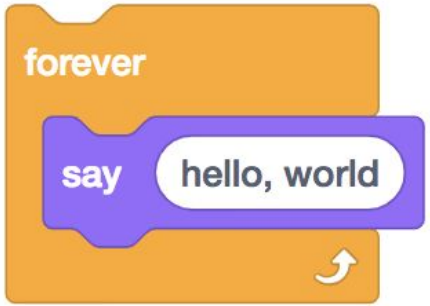


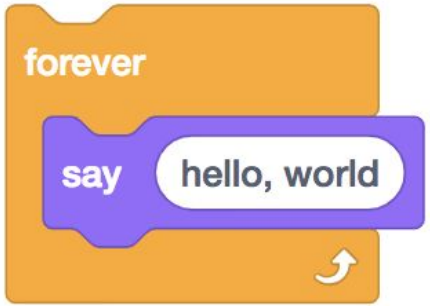

if
x
<
y
then
say
x is less than y
else
if
x
>
y
then
say
x is greater than y
else
say
x is equal to y



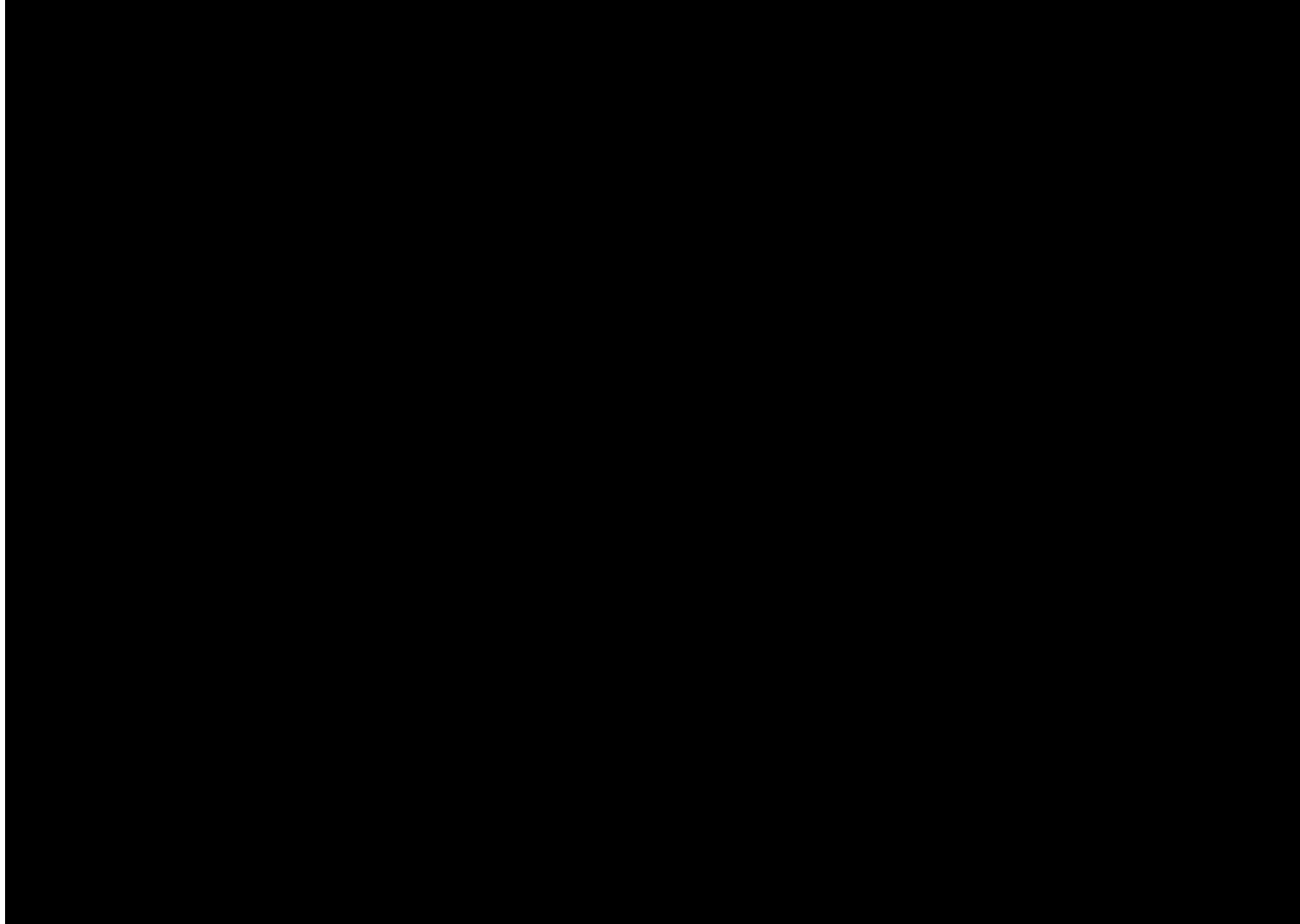

```
if x < y:
    print("x is less than y")
elif x > y:
    print("x is greater than y")
else:
    print("x is equal to y")
```




forever
say
hello, world




```
while True:
    print("hello, world")
```




repeat
3
say
hello, world

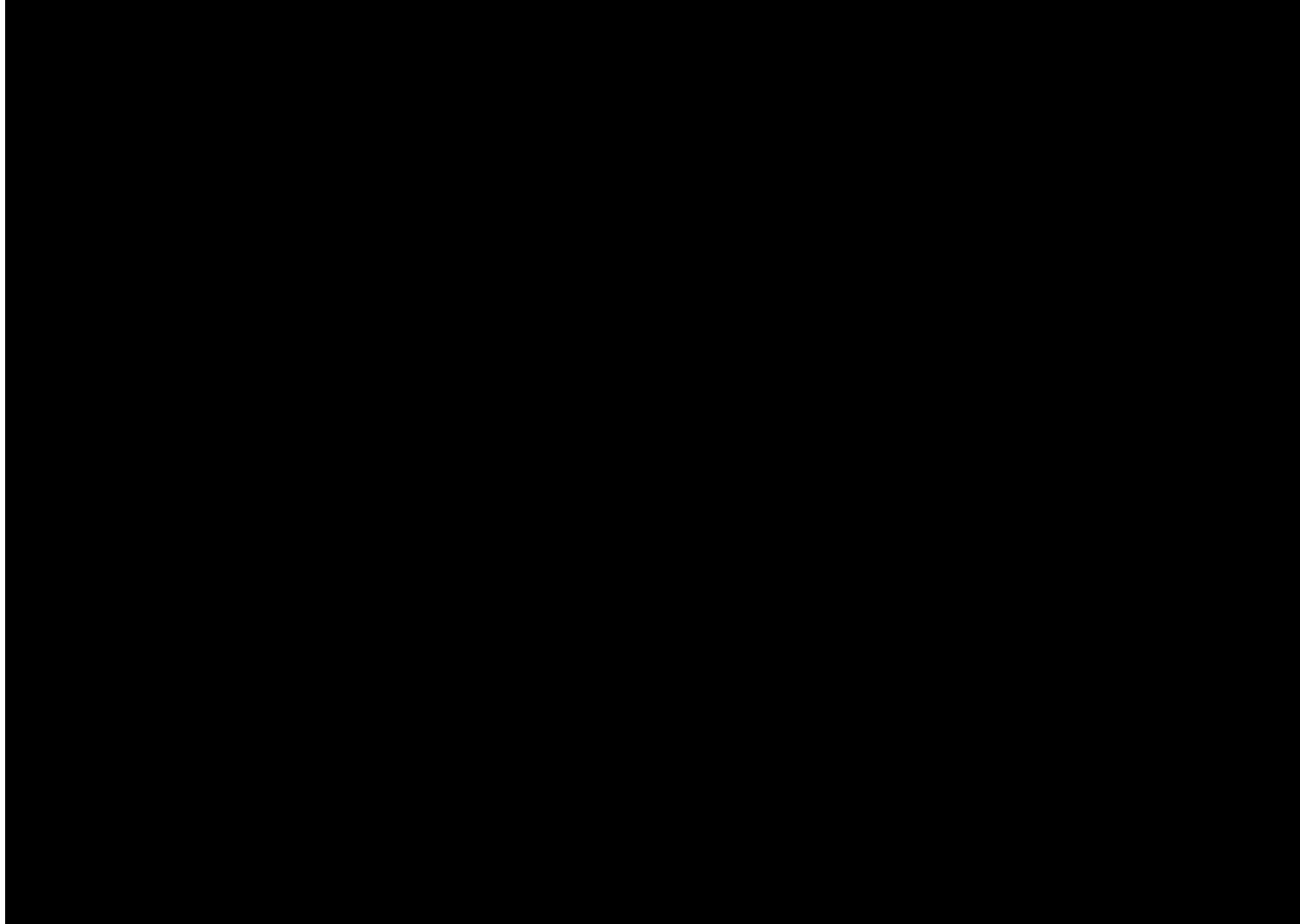

```
i = 0
while i < 3:
    print("hello, world")
    i += 1
```


repeat
3
say
hello, world


```
for i in [0, 1, 2]:
    print("hello, world")
```


```
for i in range(3):
    print("hello, world")
```


```
for _ in range(3):
    print("hello, world")
```




ask
What's your name?
and wait
say
join
hello,
answer


```
answer = input("What's your name? ")
print("hello, " + answer)
```


```
answer = input("What's your name? ")
print("hello, " + answer)
```


```
answer = input("What's your name? ")
print(f"hello, {answer}")
```

```
bool

float

int

str

...
```

| | |
|---|---|
| `bool` | Boolean value |
| `float` | floating-point value |
| `int` | integer |
| `str` | string |
| `...` | |

```
range

list

tuple

dict

set

...
```

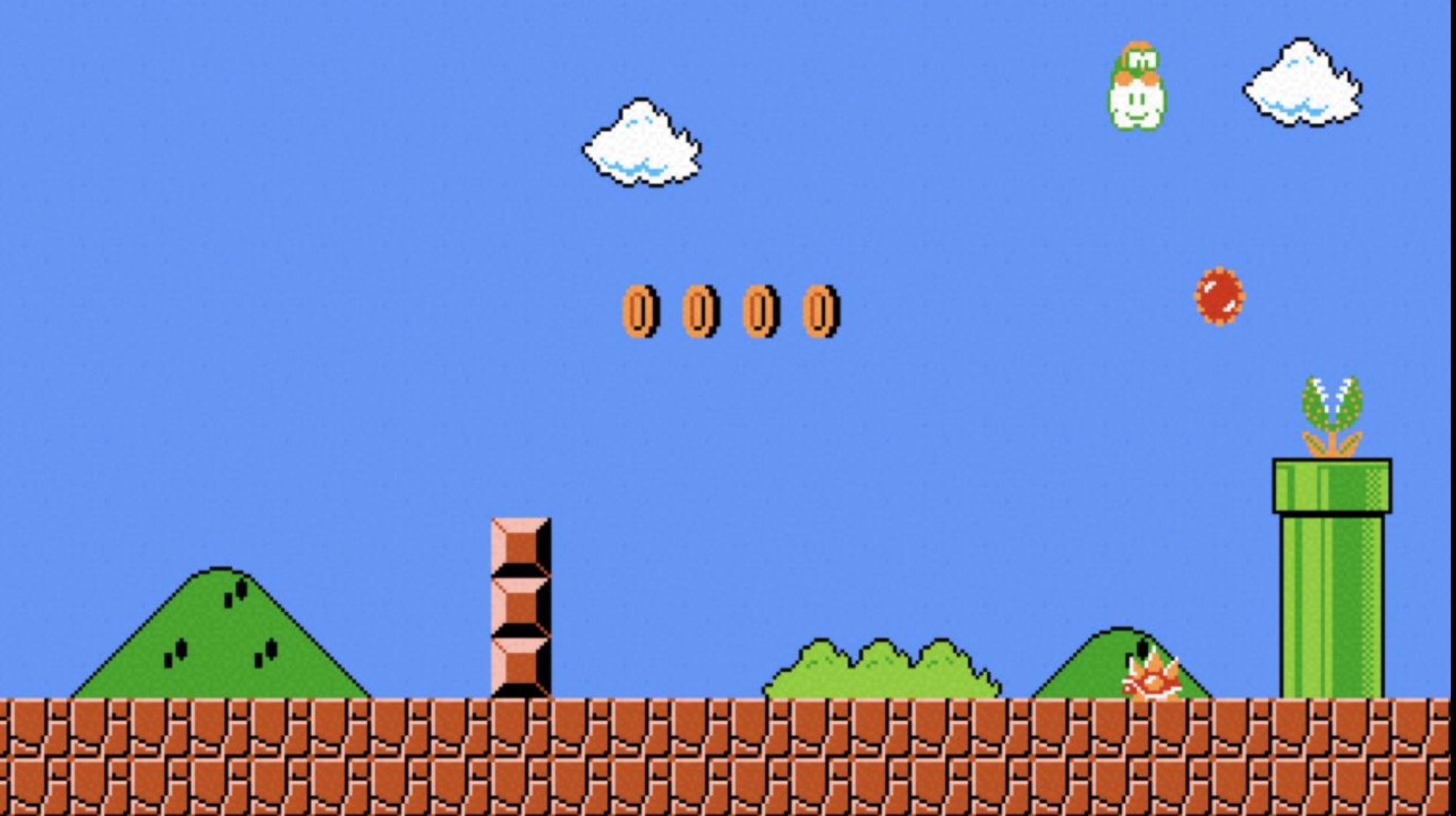
| | |
|---|---|
| `range` | sequence of numbers |
| `list` | sequence of mutable values |
| `tuple` | sequence of immutable values |
| `dict` | collection of key-value pairs |
| `set` | collection of unique values |
| `...` | |

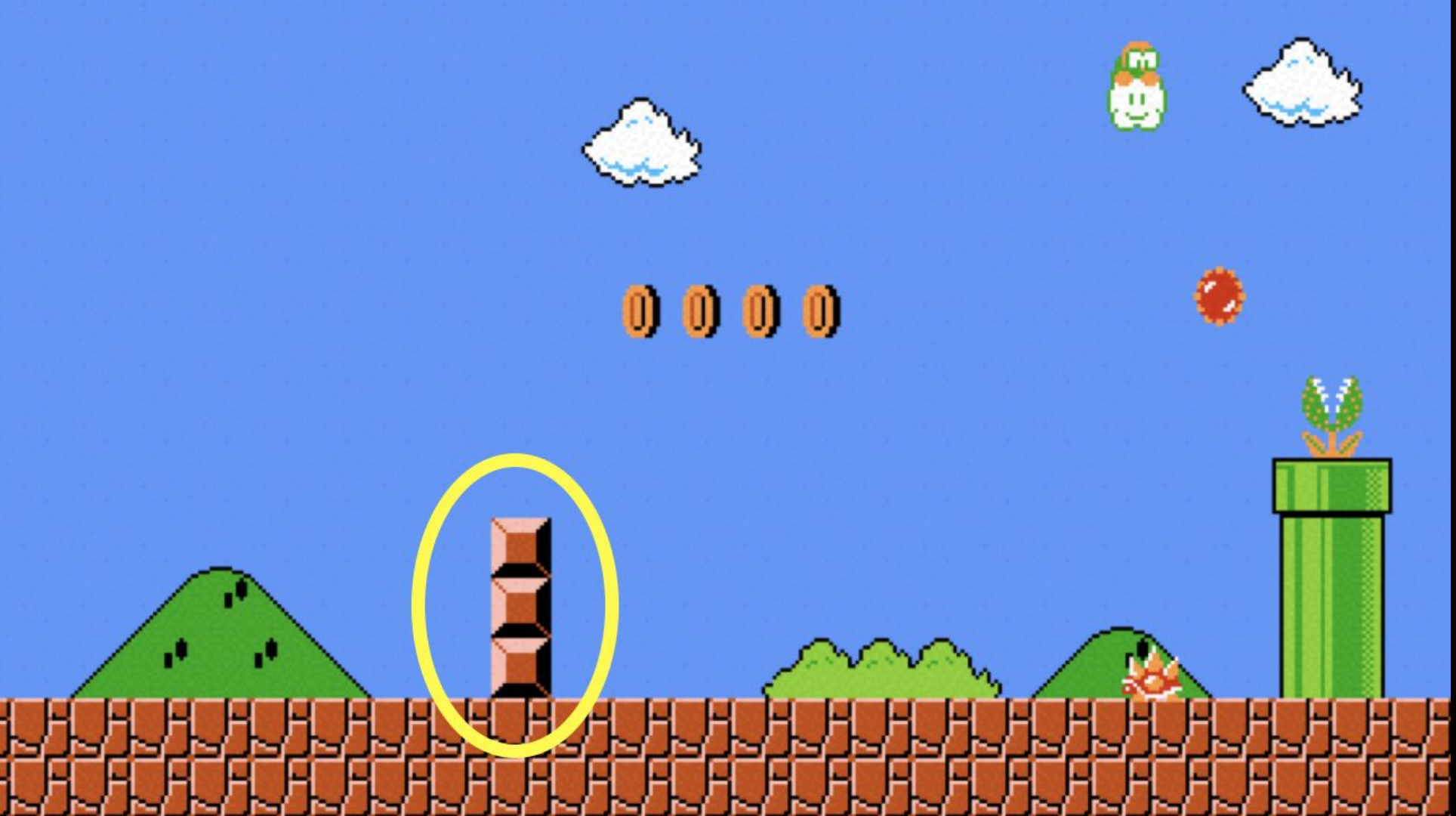
docs.python.org

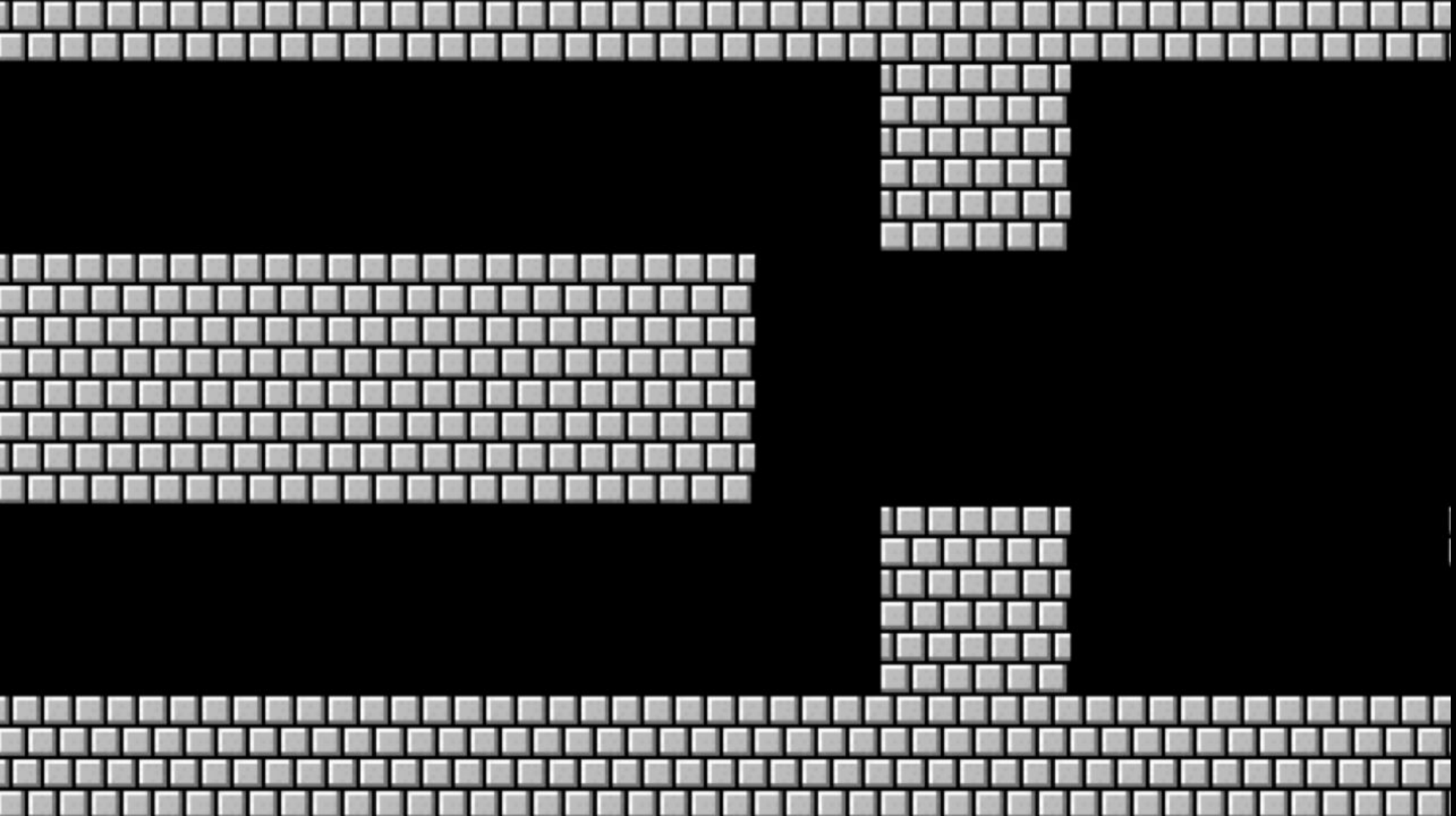
floating-point imprecision

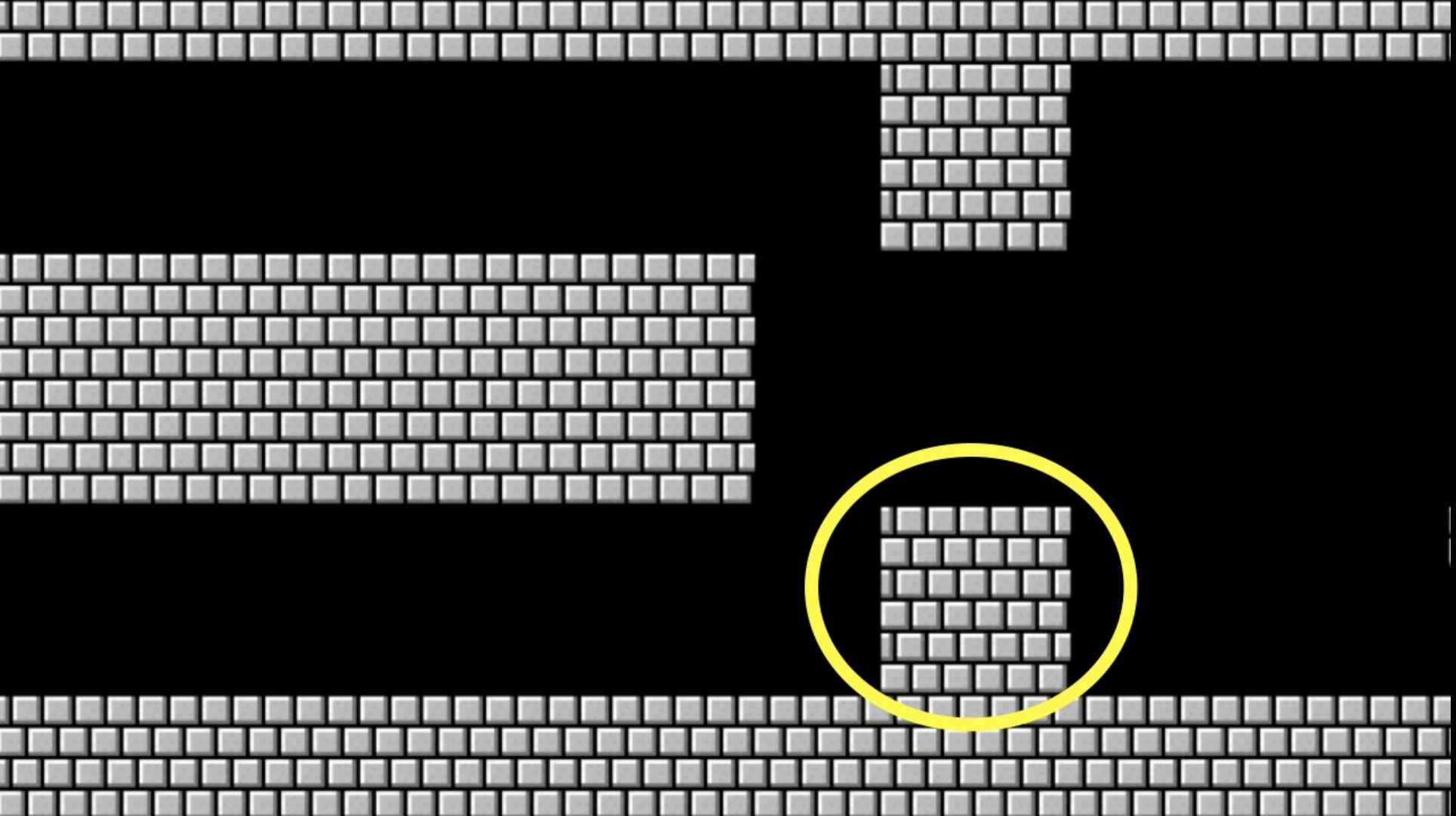
integer overflow

Greetings from M.Gandhi, ruler
and King of the Indians...
Our words are backed
with NUCLEAR WEAPONS!









# Assignment 1

cs50.harvard.edu/hls/2021/winter/assignments/1

# Office Hours

cs50.harvard.edu/hls/2021/winter/hours

# CS50 for JDs

cs50.harvard.edu/hls