

# CS50 for JDs

Python

Do put out name tent if you have. If you left behind (or asked us for one yesterday), check front row. If you lost, email [hls@cs50.harvard.edu](mailto:hls@cs50.harvard.edu), and we'll re-print!

[github.com/signup](https://github.com/signup)

"I want to get familiar with all the knowledge about CS and develop a basic body of knowledge."

"How do the devices we use every day  
actually work?"

"How machine-learning algorithms work,  
fairness metrics"

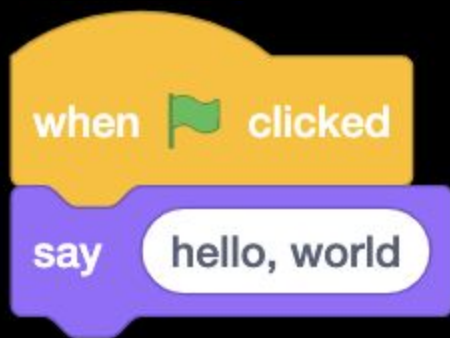
"Will AI really replace lawyers?"

"What are common cybersecurity issues lawyers should be aware of..."

"What is most important to computer scientists when they work with lawyers?"



"I took Java in 2012 and got an 18% on the exam so this will be an adventure to round out my time in academia."



when  clicked

say 

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

[cs50.harvard.edu/python](https://cs50.harvard.edu/python)

# Programming Languages

- ...

source 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

...

```

...
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

```

...



```
#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");
    }
}
```

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

[wikipedia.org/wiki/List\\_of\\_programming\\_languages](https://wikipedia.org/wiki/List_of_programming_languages)

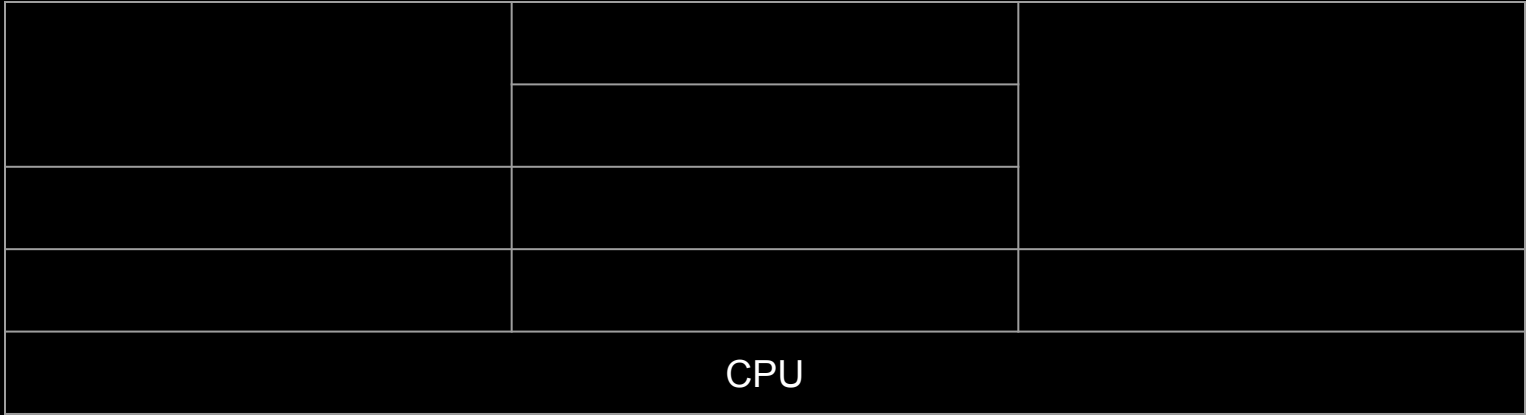
[helloworldcollection.de](http://helloworldcollection.de)

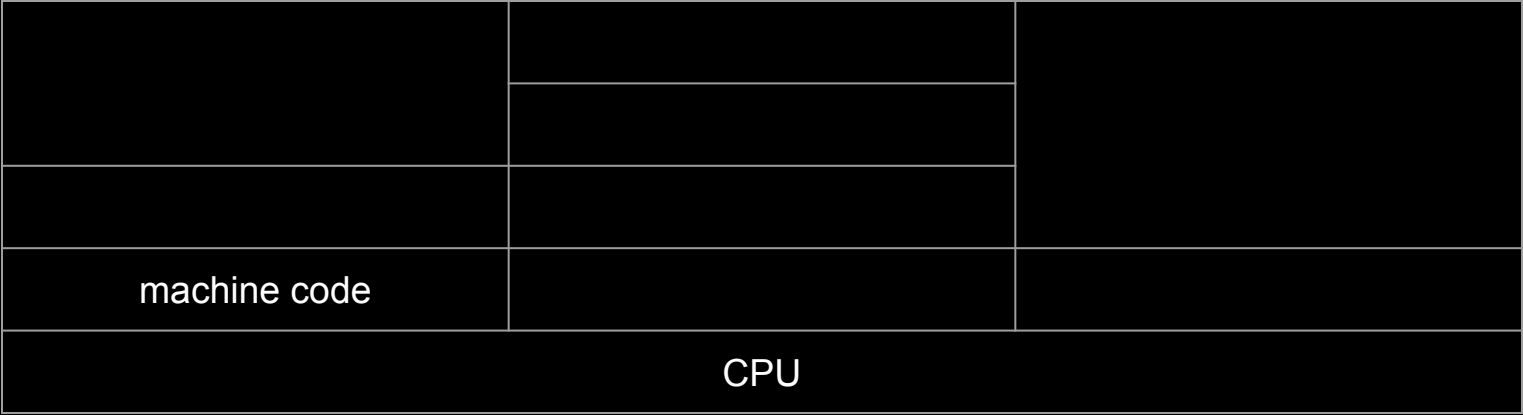
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00000001	00000000	00111110	00000000	00000001	00000000	00000000	00000000
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00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
00101000	00000010	00000000	00000000	00000000	00000000	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

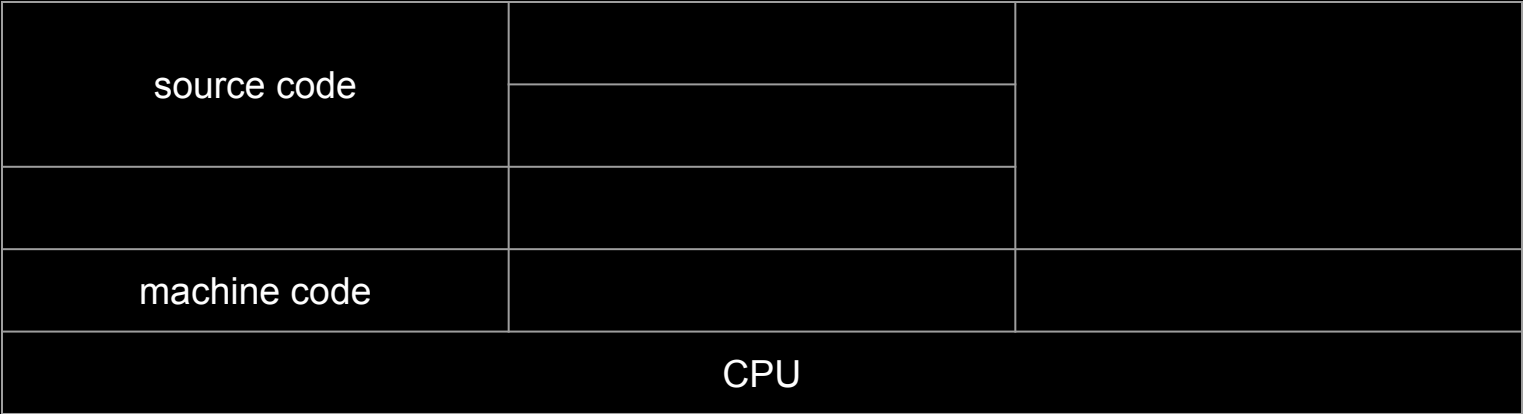
...

machine code

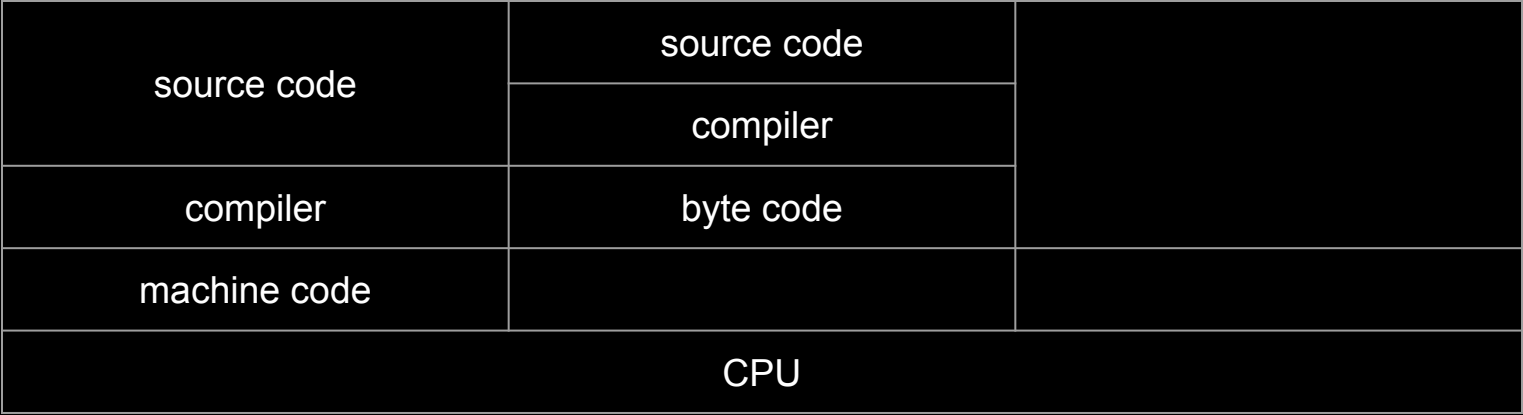








source code		
compiler		
machine code		
CPU		



source code	source code	
	compiler	
compiler	byte code	
machine code	virtual machine	
CPU		

source code	source code	source code
	compiler	
compiler	byte code	
machine code	virtual machine	
CPU		

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



# VS Code

[code.cs50.io](https://code.cs50.io)

```
python hello.py
```

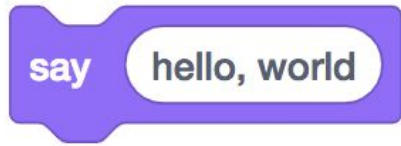


Python

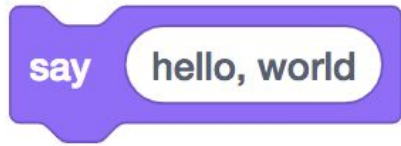




```
print( )
```



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



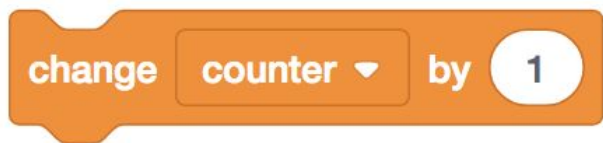
```
print("hello, world")
```







```
counter = 0
```





```
counter = counter + 1
```

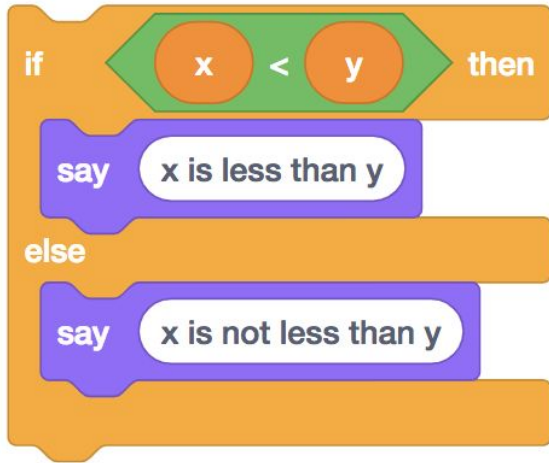


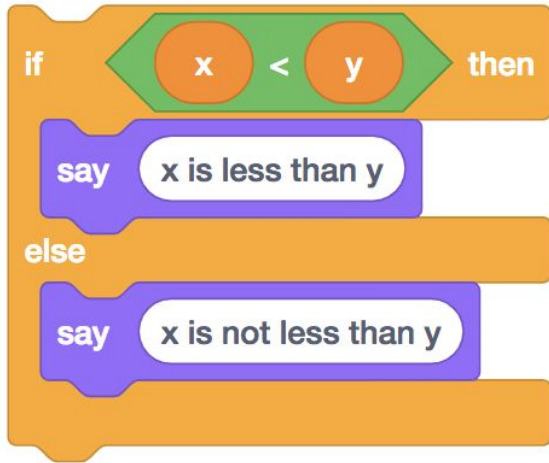
```
counter += 1
```





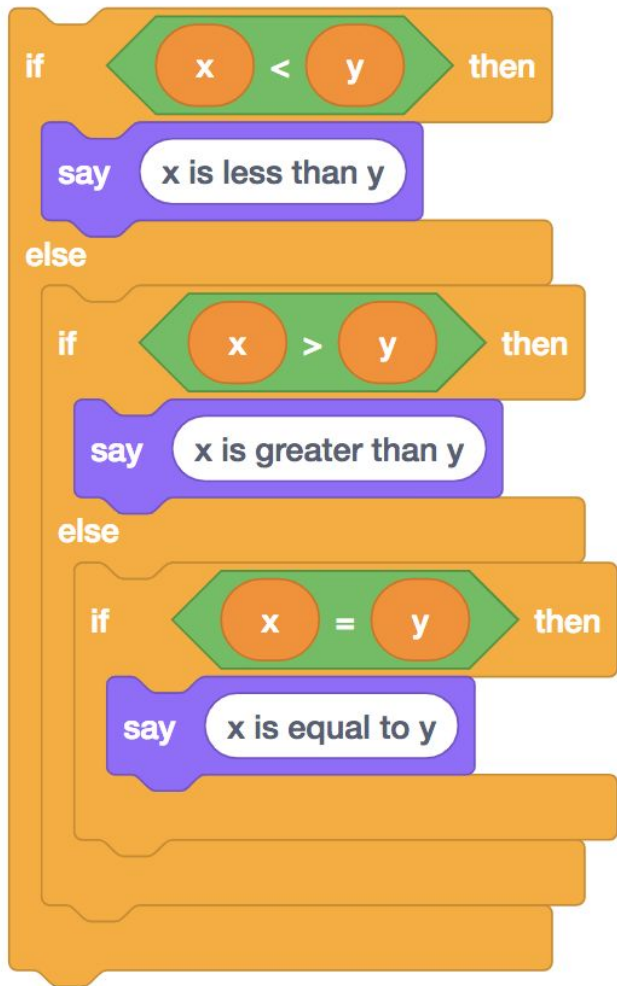
```
if x < y:  
    print("x is less than y")
```

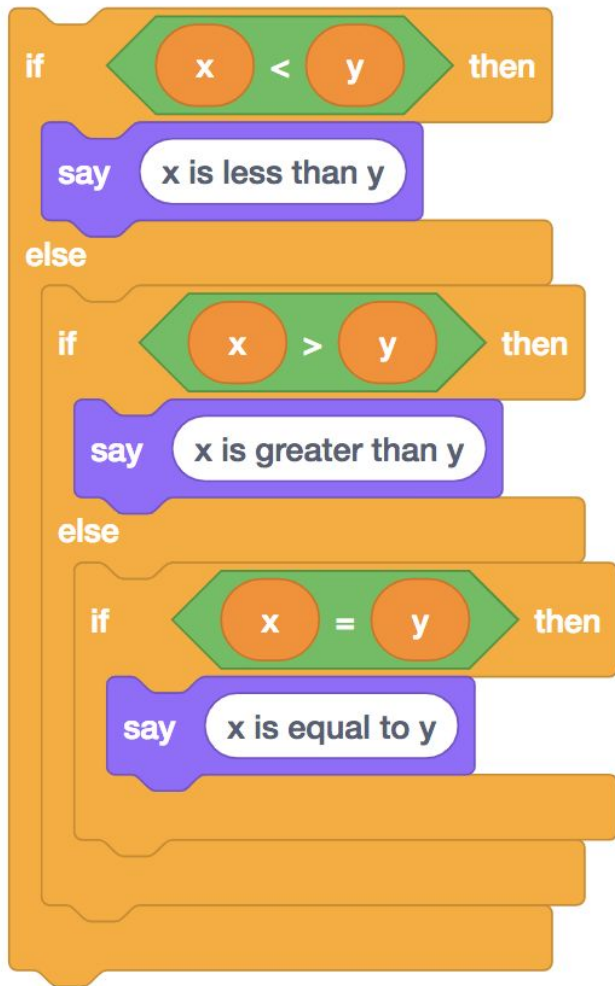




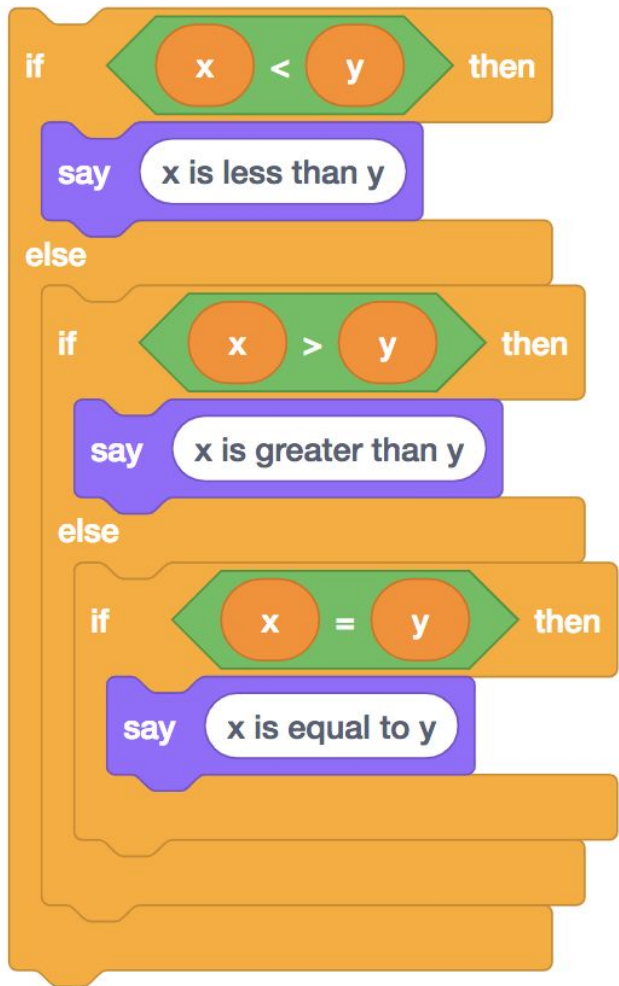
```
if x < y:  
    print("x is less than y")  
else:  
    print("x is not less than y")
```

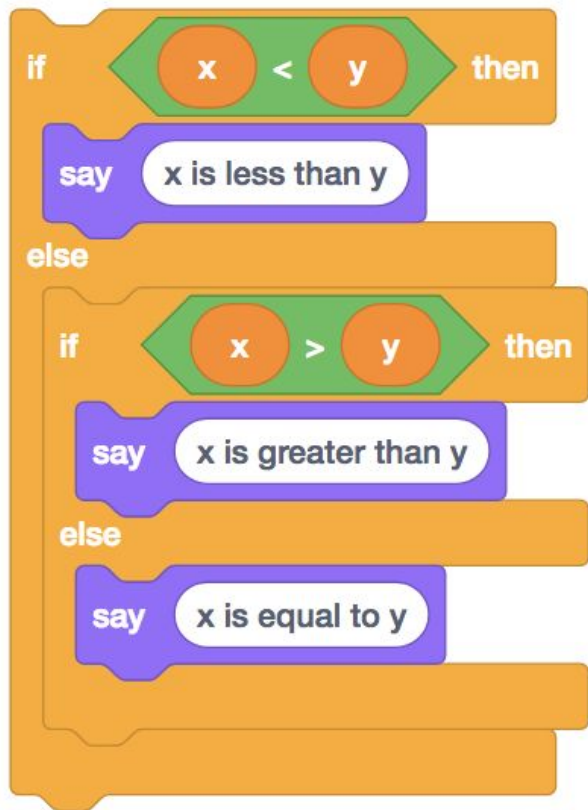


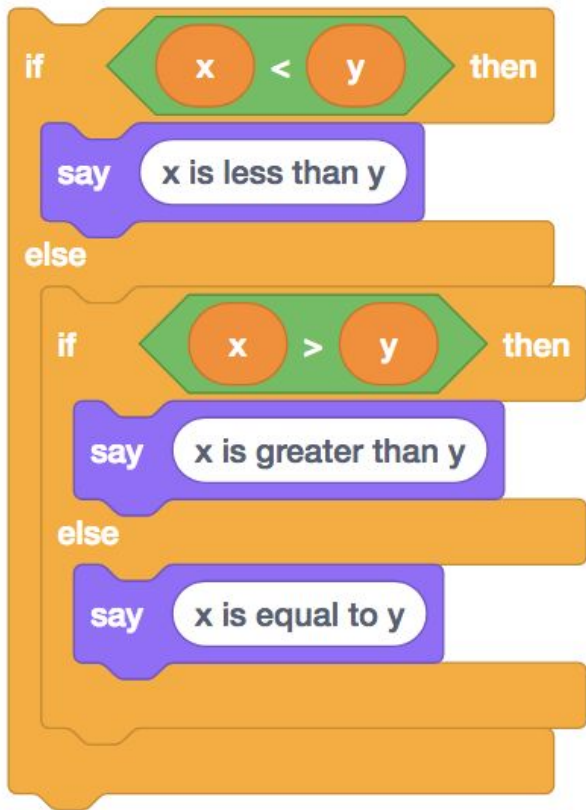




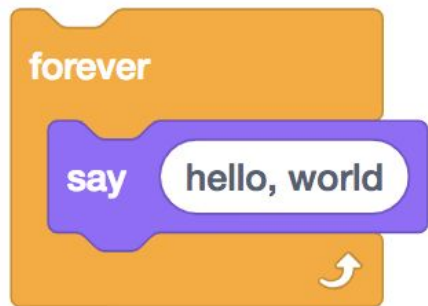
```
if x < y:  
    print("x is less than y")  
elif x > y:  
    print("x is greater than y")  
elif x == y:  
    print("x is equal to y")
```

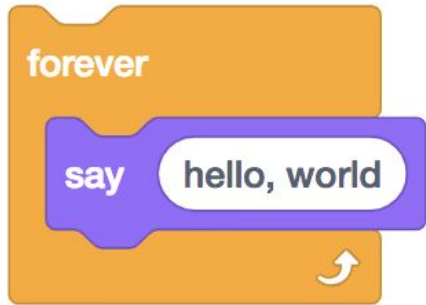




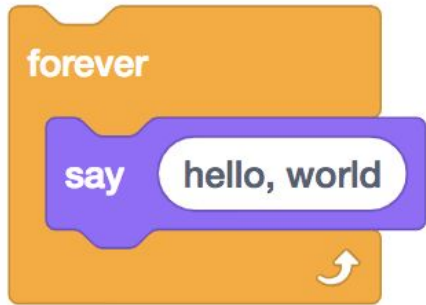


```
if x < y:  
    print("x is less than y")  
elif x > y:  
    print("x is greater than y")  
else:  
    print("x is equal to y")
```



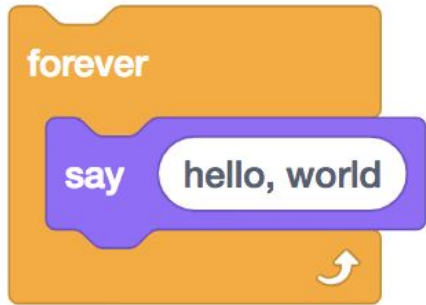


while

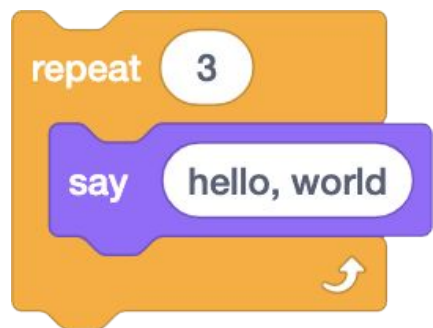


```
while  
    print("hello, world")
```





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

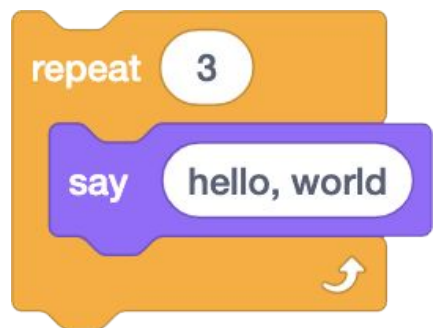




```
i = 0
while i < 3:
    print("hello, world")
    i += 1
```



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

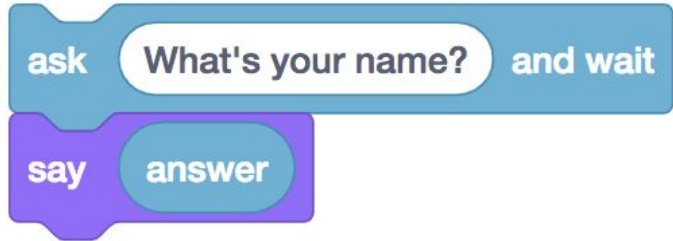




```
for i in [0, 1, 2]:  
    print("hello, world")
```



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







```
answer = input("What's your name? ")
```



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

ask What's your name? and wait

say join hello, answer



```
answer = input("What's your name? ")
```



```
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

...

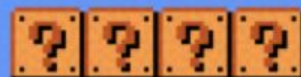


<code>bool</code>	Boolean value
<code>float</code>	floating-point value
<code>int</code>	integer
<code>str</code>	string
<code>...</code>	

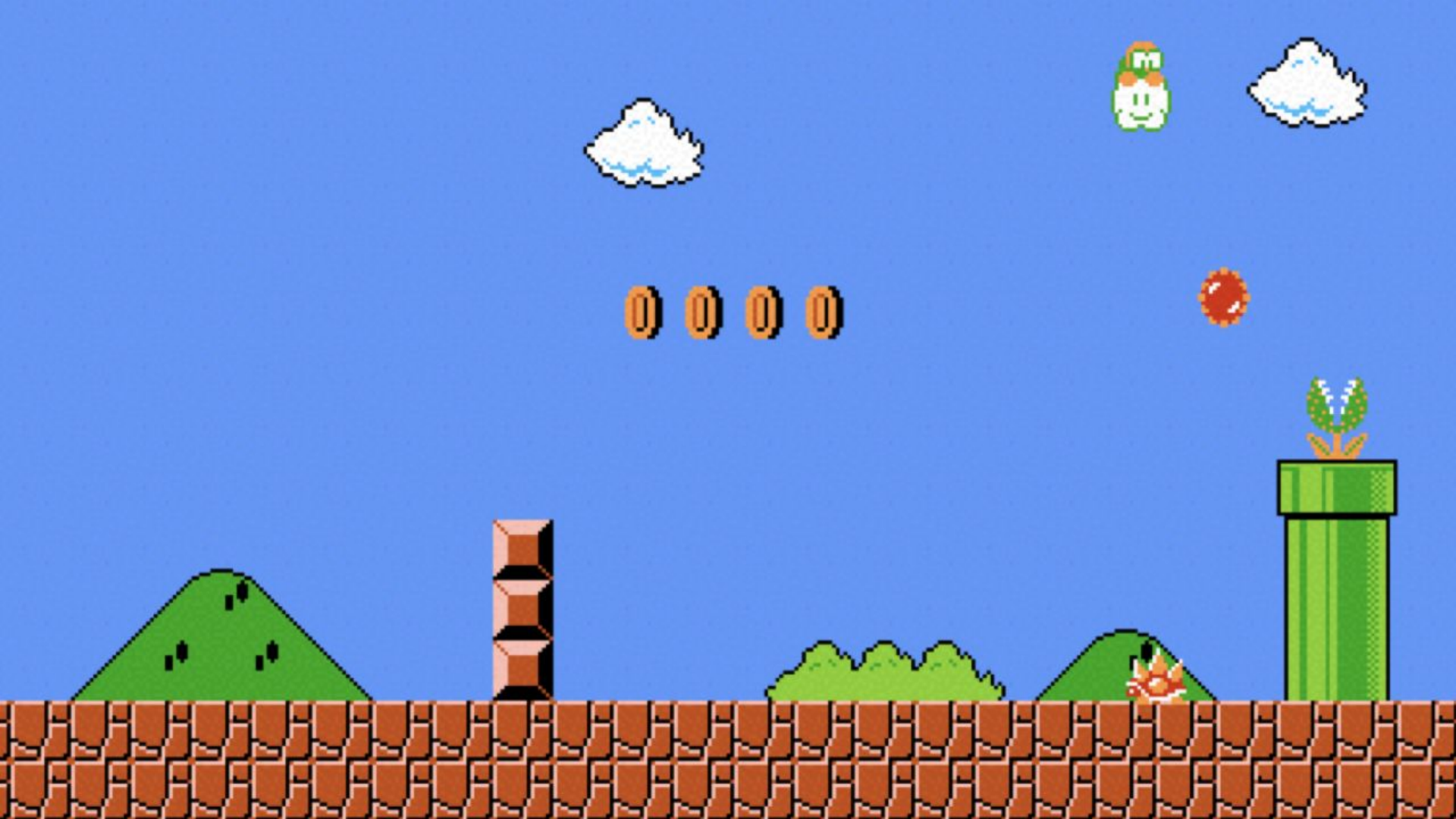
<code>range</code>	sequence of numbers
<code>list</code>	sequence of mutable values
<code>tuple</code>	sequence of immutable values
<code>dict</code>	collection of key-value pairs
<code>set</code>	collection of unique values
<code>...</code>	

[docs.python.org](https://docs.python.org)

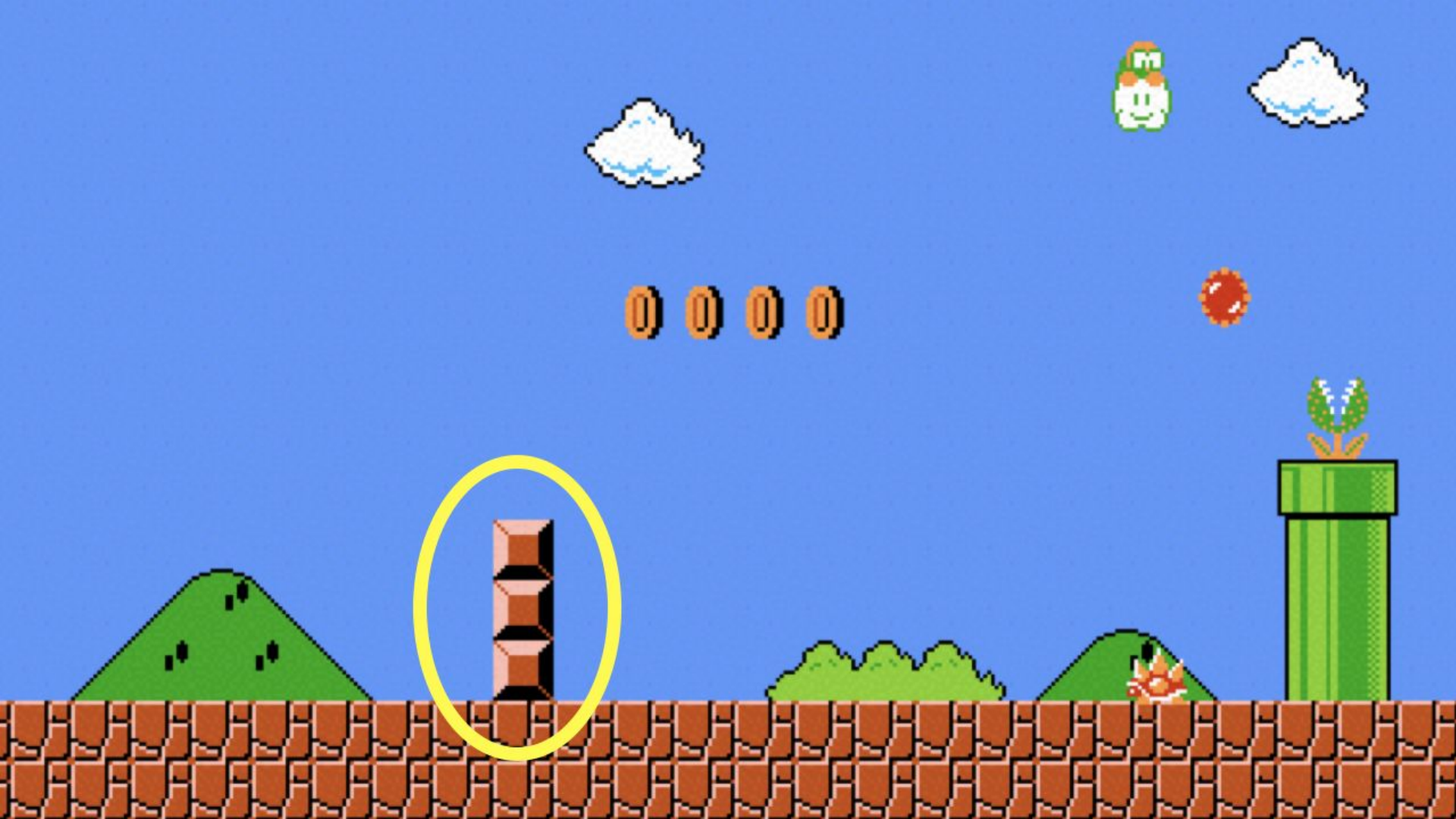
[docs.python.org/3/library/stdtypes.html#text-sequence-type-str](https://docs.python.org/3/library/stdtypes.html#text-sequence-type-str)



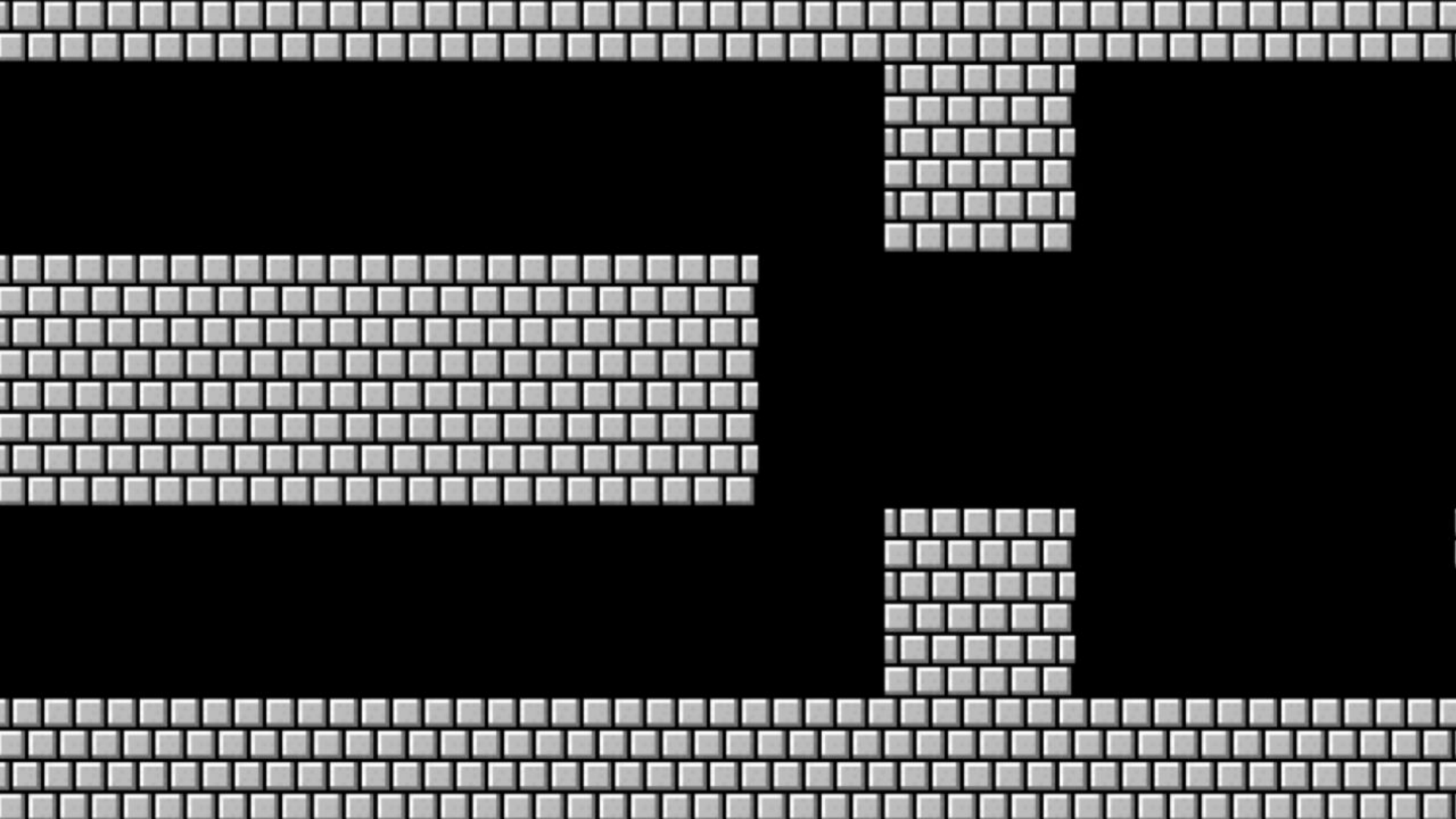


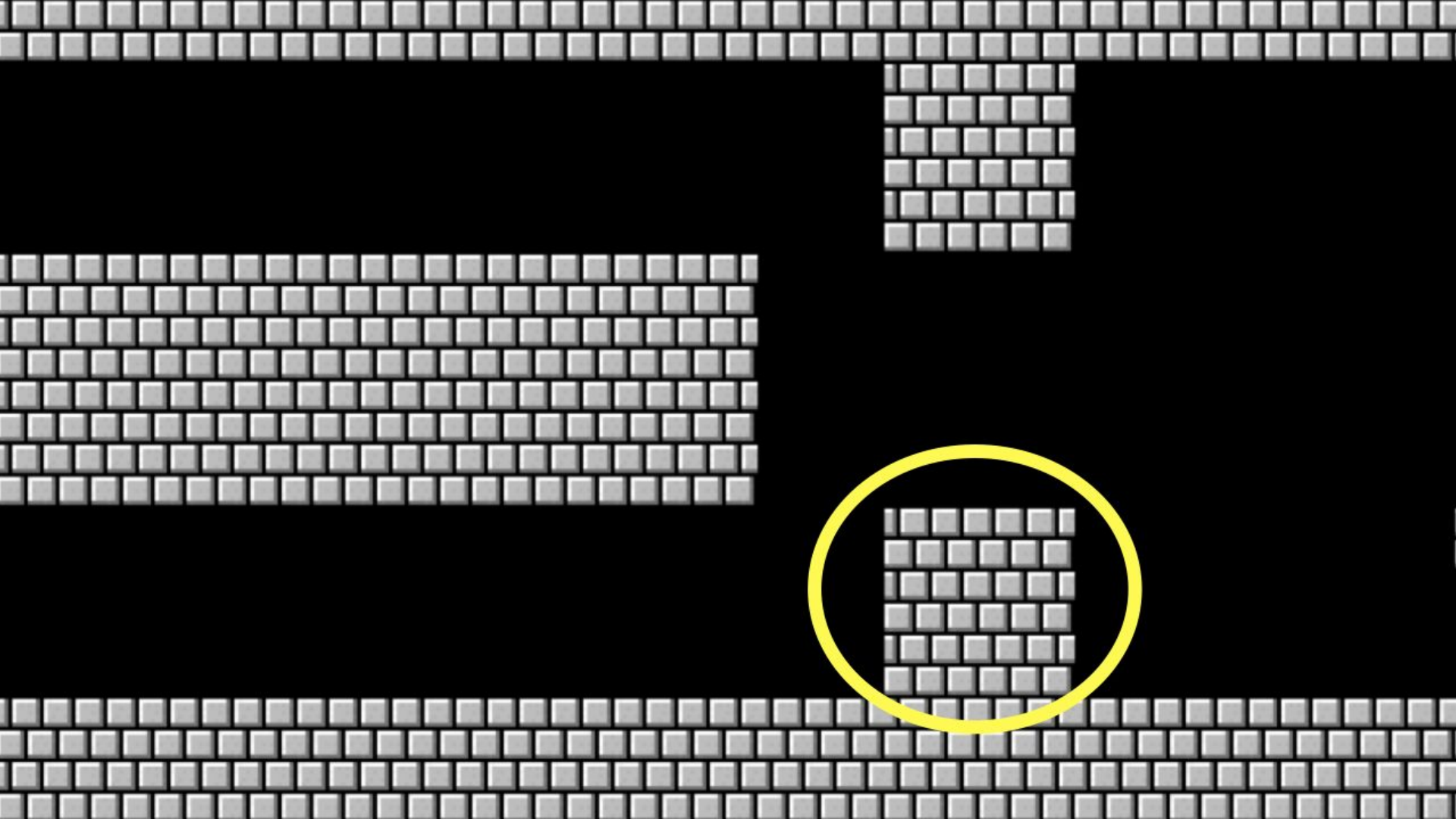












floating-point imprecision

integer overflow

1 2 3

1 2 4

1 2 5

1 2 6



1 2 7

1 2 8

1 2 9

1 2 10

1 2 9

1

1 2 0

1 3 0

9 9 9



1

9

9

0

1

9

0

0

1

0

0

0

1 0 0 0

0 0 0

1 1 1

1  
1 1 0

1  
1 0 0



1

0

0

0

1 0 0 0

0 0 0



# Assignment 1

# Office Hours

# CS50 for JDs

Python