Hi! This is CS50.

- If just added, see cs50.harvard.edu for website. Email heads@cs50.harvard.edu with questions.
- Today's lecture is 3pm–5pm. We'll take a short break (with cookies) partway through.
- See website after lecture for Quiz 1, due tomorrow (Tue 9/10) at 9am.
- See website for sectioning form, due tomorrow (Tue 9/10) at 11:59pm.
- If you have trouble seeing projector, see live.cs50.io/screen for a live feed.
- See website after lecture for Problem Set 1, due Sun 9/14 at 11:59pm.
- Attend Orientation tomorrow (Tue 9/10) or Wed 9/11, 4:30pm–5:45pm, in Emerson 105.
- Optionally attend Brian's Supersection tonight at 7:30pm via Zoom, per website.

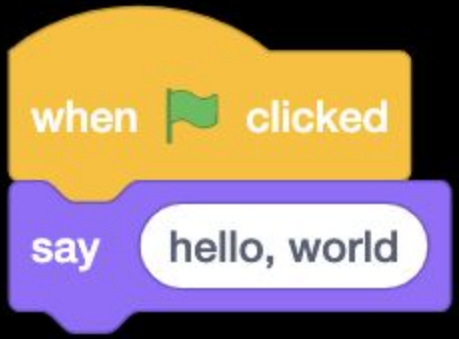
This is CS50

```c
#include <stdio.h>

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

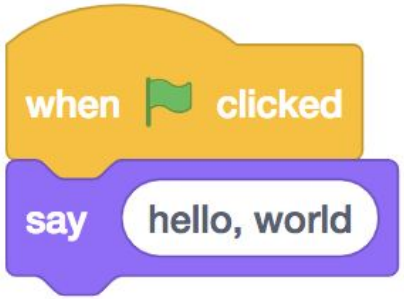
2/3

of CS50 students have never taken CS before

```c
#include <stdio.h>

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


when clicked
say
hello, world

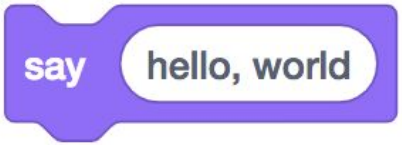
- functions
- conditions
- Boolean expressions
- loops

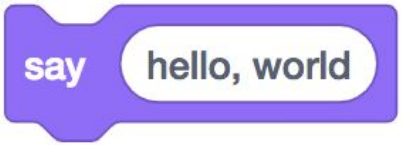



```c
#include <stdio.h>

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

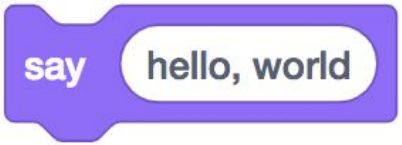

when clicked


```
int main(void)
{

}
```

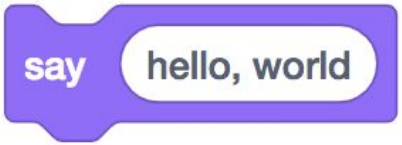

say
hello, world



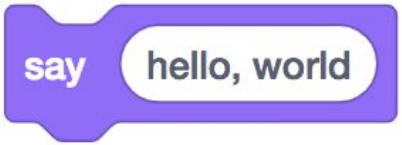

```
print (                )
```



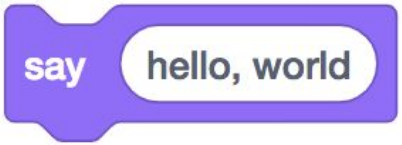

```
printf(                )
```



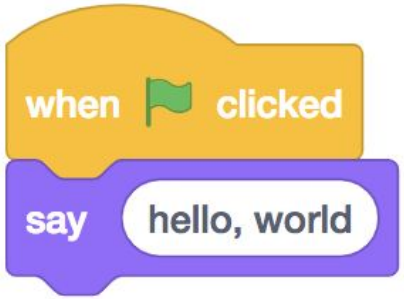

```
printf( hello, world )
```

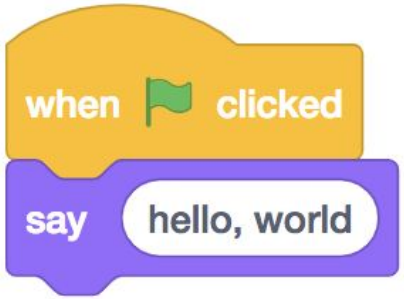



```
printf("hello, world")
```

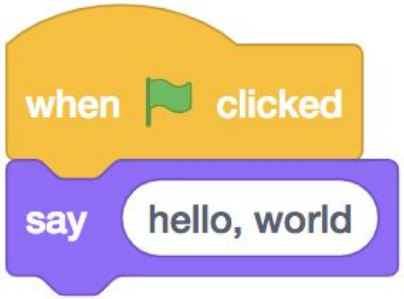



```
printf("hello, world");
```


when clicked
say hello, world




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




```c
#include <stdio.h>

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

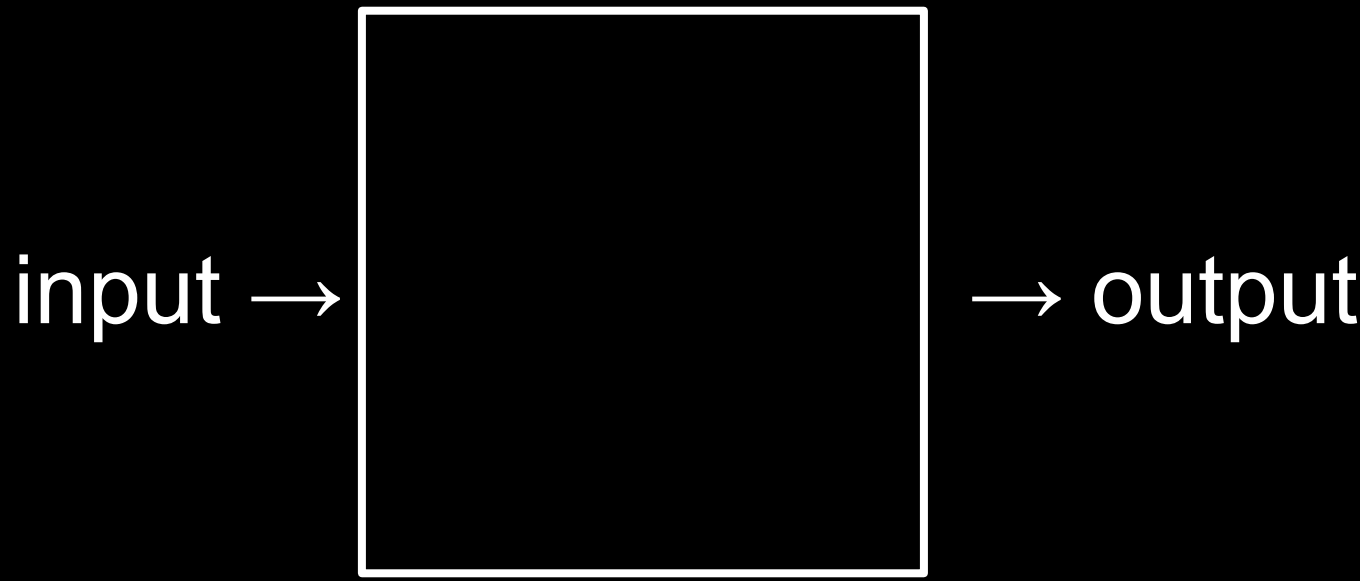
CS50 Sandbox

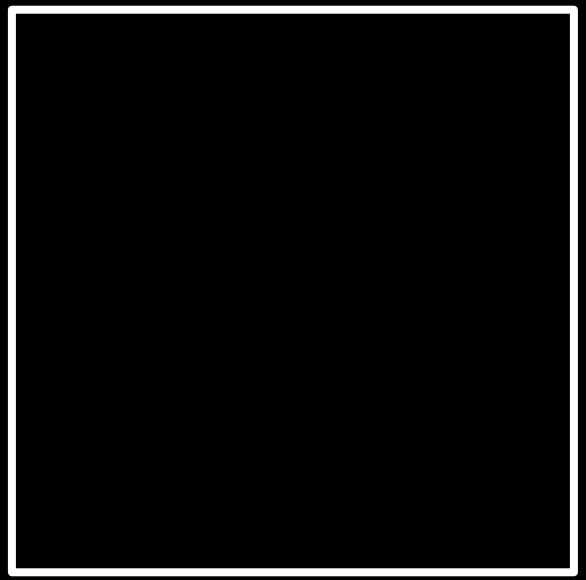
sandbox.cs50.io

```
cd

ls

mkdir

rm

rmdir

...
```

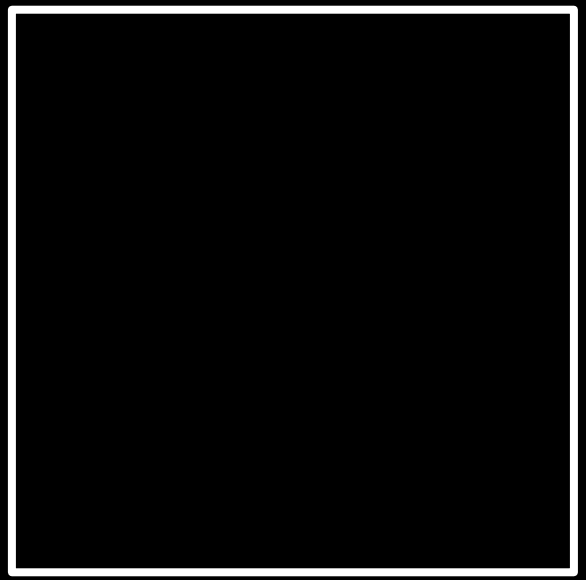
```c
#include <stdio.h>

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

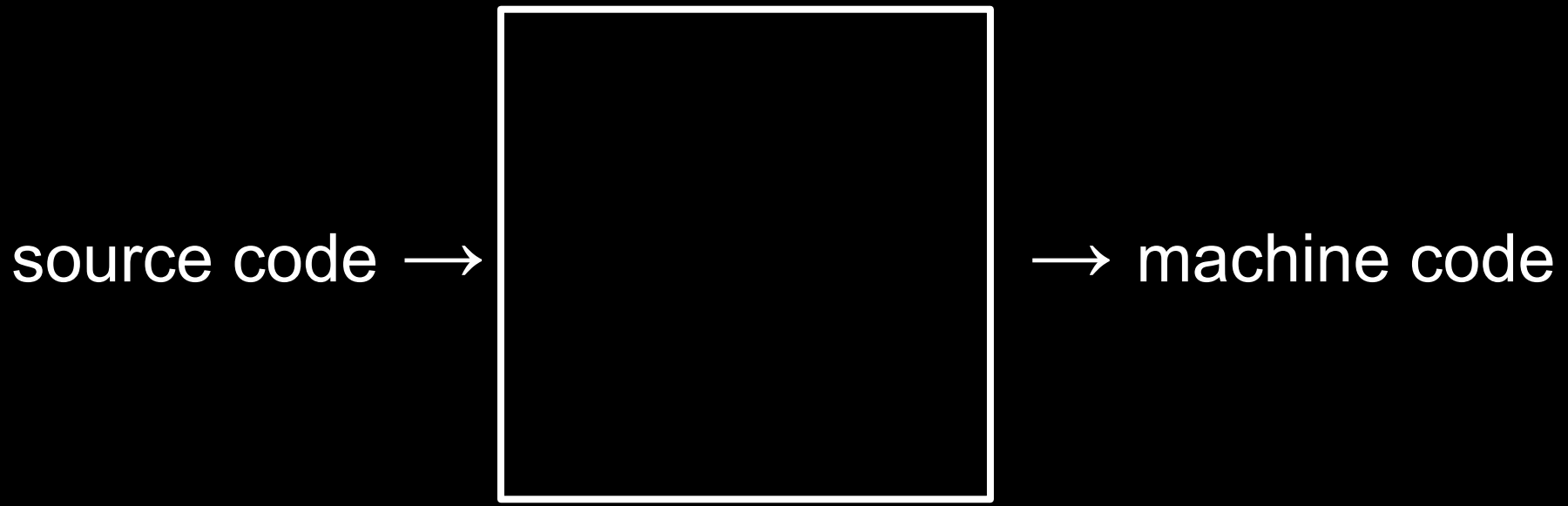
```
01111111 01000101 01001100 01000110 00000010 00000001 00000001 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000010 00000000 00111110 00000000 00000001 00000000 00000000 00000000
10110000 00000101 01000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
11010000 00010011 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 01000000 00000000 00111000 00000000
00001001 00000000 01000000 00000000 00100100 00000000 00100001 00000000
00000110 00000000 00000000 00000000 00000101 00000000 00000000 00000000
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 01000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 01000000 00000000 00000000 00000000 00000000 00000000
11111000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
11111000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
00001000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000011 00000000 00000000 00000000 00000100 00000000 00000000 00000000
00111000 00000010 00000000 00000000 00000000 00000000 00000000 00000000
...
```

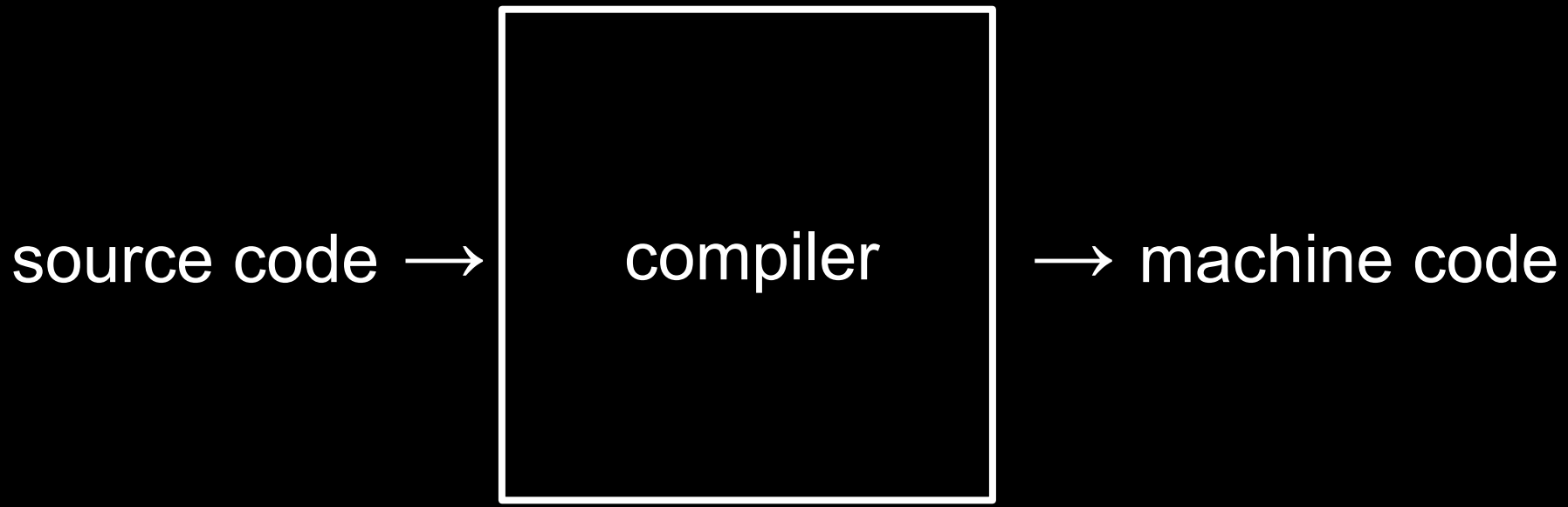

input →
→ output



source code ⟶




source code ⟶
⟶ machine code


source code
compiler
machine code

```c
#include <stdio.h>

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

```c
#include <stdio.h>

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

```
clang hello.c

./a.out
```

```
clang -o hello hello.c

./hello
```


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


```
get_string(                    )
```


```
get_string("What's your name?\n")
```


```
answer = get_string("What's your name?\n")
```


```
string answer = get_string("What's your name?\n")
```


```
string answer = get_string("What's your name?\n");
```


```
string answer = get_string("What's your name?\n");
printf(                          );
```


```
string answer = get_string("What's your name?\n");
printf("hello, %s\n"        );
```


```
string answer = get_string("What's your name?\n");
printf("hello, %s\n", answer);
```

```
clang -o hello hello.c -lcs50

./hello
```

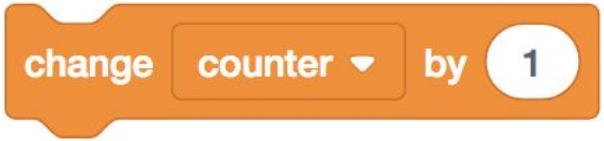
```
make hello

./hello
```

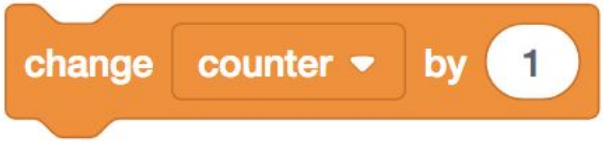

set
counter
to
0


```
counter = 0
```

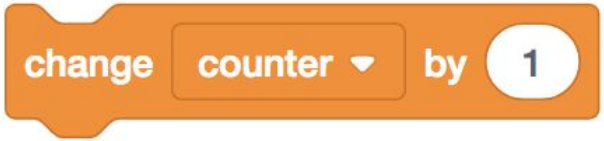

```
int counter = 0
```


```
int counter = 0;
```

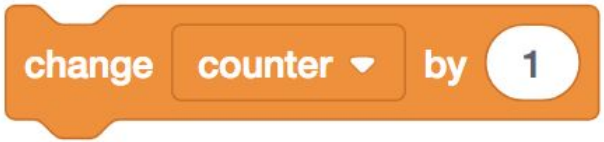

change
counter
by
1



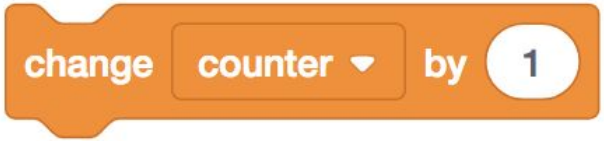

```
counter = counter + 1
```




```
counter = counter + 1;
```




```
counter += 1;
```

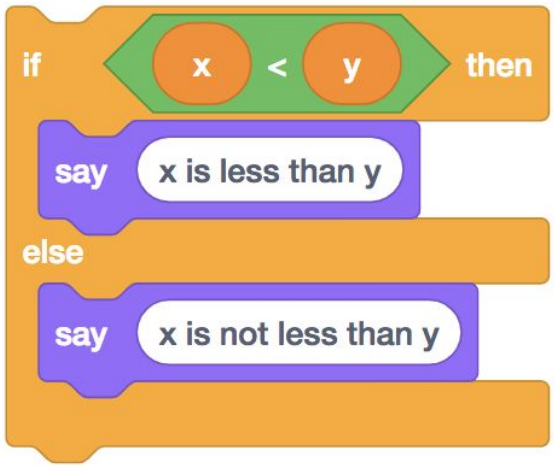


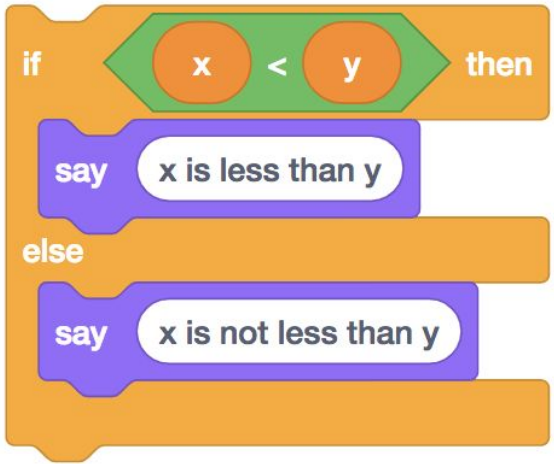

```
counter++;
```


if
x
<
y
then
say
x is less than y

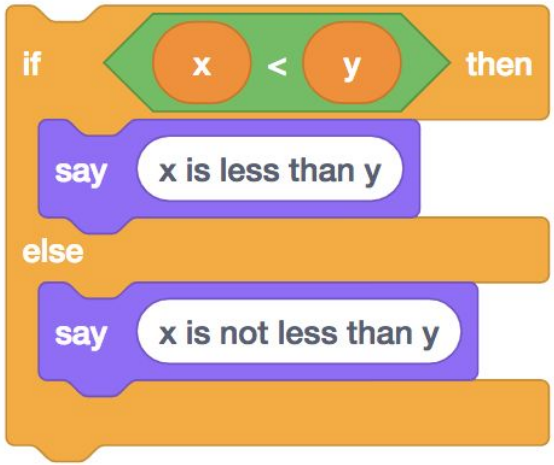

```
if (x < y)
{

}
```


```
if (x < y)
{
    printf("x is less than y\n");
}
```

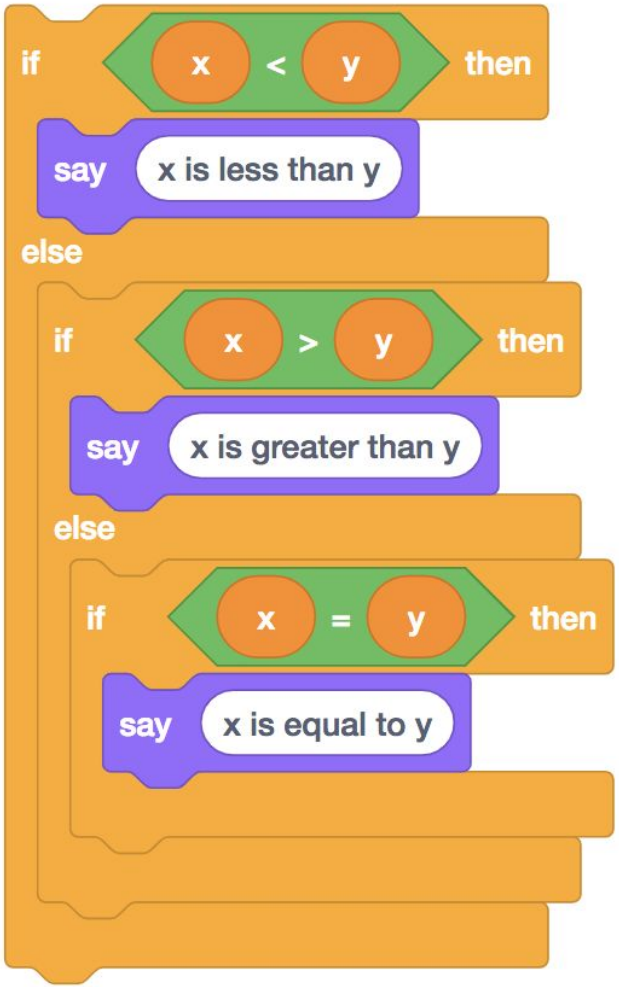

if
x
<
y
then
say
x is less than y
else
say
x is not less than y

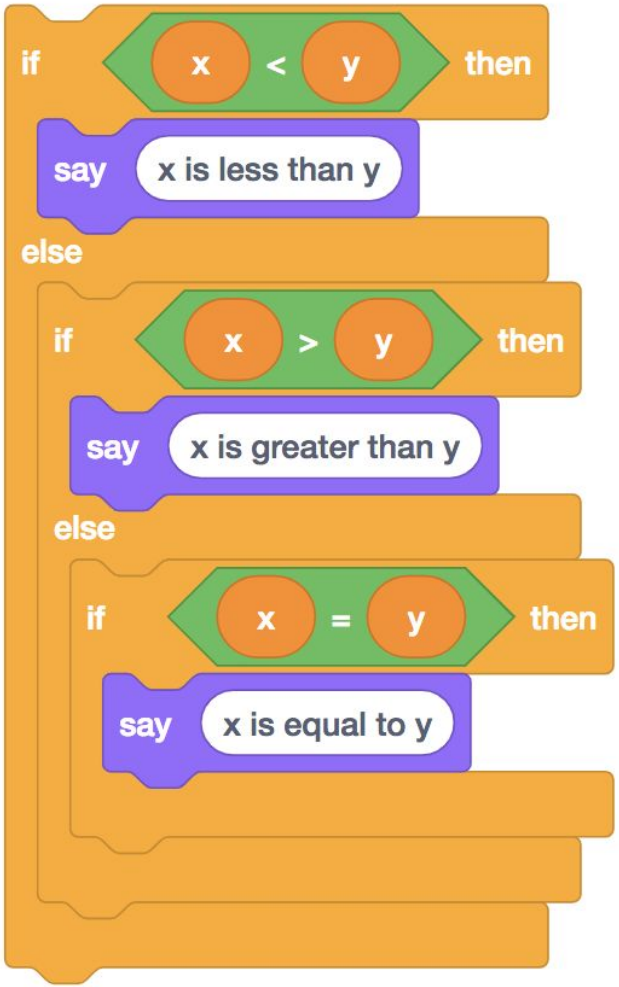



```
if (x < y)
{

}
else
{

}
```

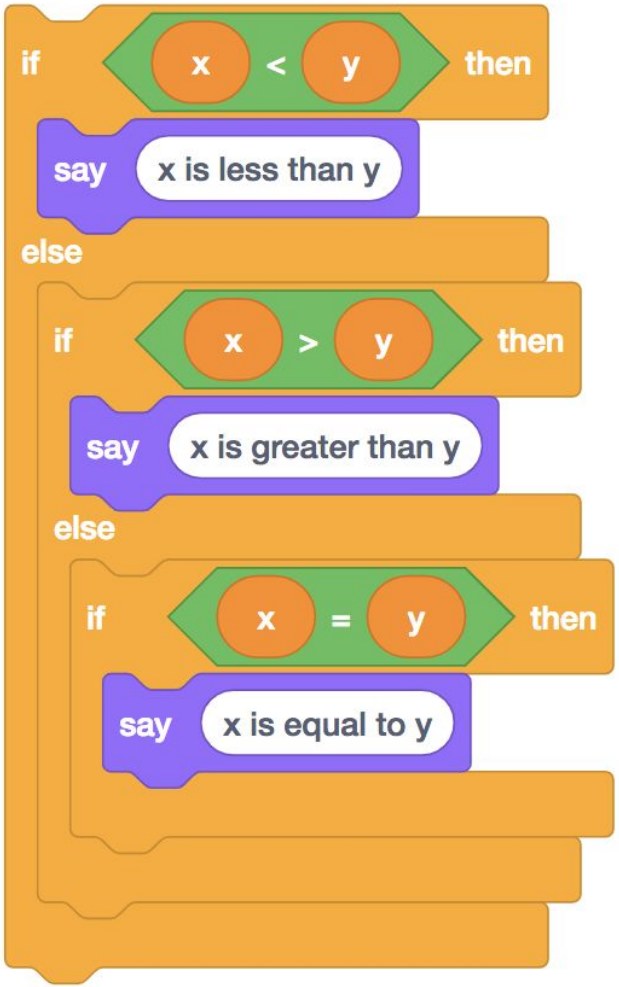



```
if (x < y)
{
    printf("x is less than y\n");
}
else
{
    printf("x is not less than y\n");
}
```

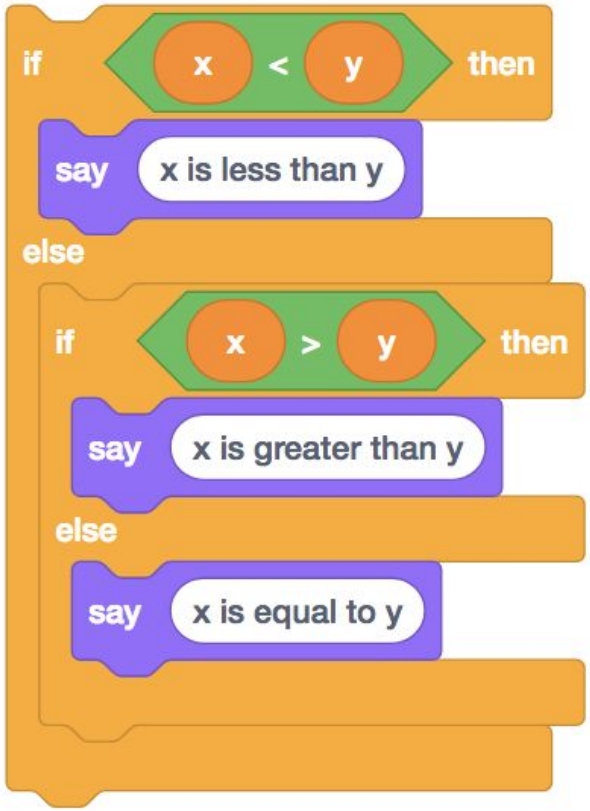

if x < y then
say x is less than y
else
if x > y then
say x is greater than y
else
if x = y then
say x is equal to y



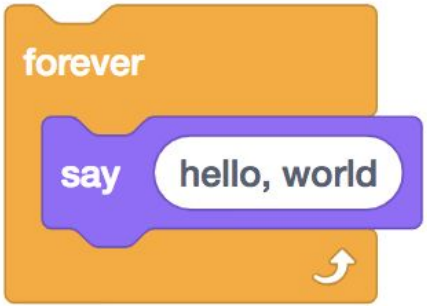

```
if (x < y)
{

}
else if (x > y)
{

}
else if (x == y)
{

}
```

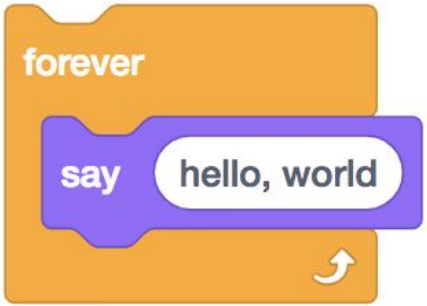



```
if (x < y)
{
    printf("x is less than y\n");
}
else if (x > y)
{
    printf("x is greater than y\n");
}
else if (x == y)
{
    printf("x is equal to y\n");
}
```

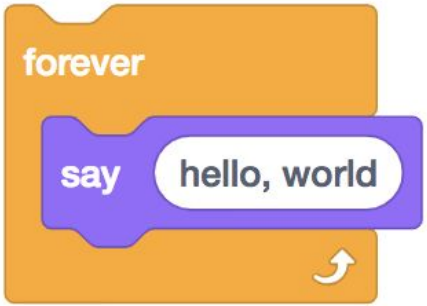



```
if (x < y)
{
    printf("x is less than y\n");
}
else if (x > y)
{
    printf("x is greater than y\n");
}
else
{
    printf("x is equal to y\n");
}
```

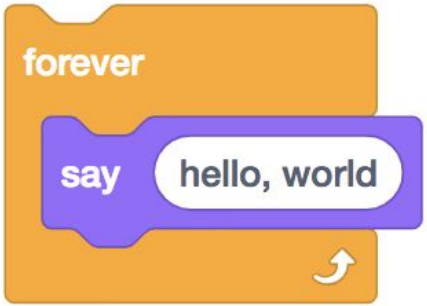

forever
say
hello, world



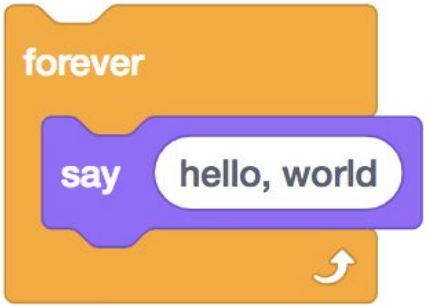

```
while
{

}
```




```
while
{
    printf("hello, world\n");
}
```




```
while (    )
{
    printf("hello, world\n");
}
```




```
while (true)
{
    printf("hello, world\n");
}
```


repeat
50
say
hello, world


```
int counter = 0;
```


```
int i = 0;
```


```
int i = 0;
while (      )
{


}
```


```
int i = 0;
while (i < 50)
{


}
```


```
int i = 0;
while (i < 50)
{
    printf("hello, world\n");

}
```


```
int i = 0;
while (i < 50)
{
    printf("hello, world\n");
    i = i + 1;
}
```


```
int i = 0;
while (i < 50)
{
    printf("hello, world\n");
    i += 1;
}
```


```
int i = 0;
while (i < 50)
{
    printf("hello, world\n");
    i++;
}
```


```
int i = 50;
while (i > 0)
{
    printf("hello, world\n");
    i--;
}
```


repeat
50
say
hello, world


```
for
{

}
```


```
for
{
    printf("hello, world\n");
}
```


```
for (                              )
{
    printf("hello, world\n");
}
```


```
for (int counter = 0;             )
{
    printf("hello, world\n");
}
```


```
for (int i = 0;                    )
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50;          )
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i = i + 1)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i += 1)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```

```
bool

char

double

float

int

long

string

...
```

```
get_char

get_double

get_float

get_int

get_long

get_string

...
```

%c

%f

%i

%li

%s

```
%c  char

%f  float, double

%i  int

%li long

%s  string
```

+

-

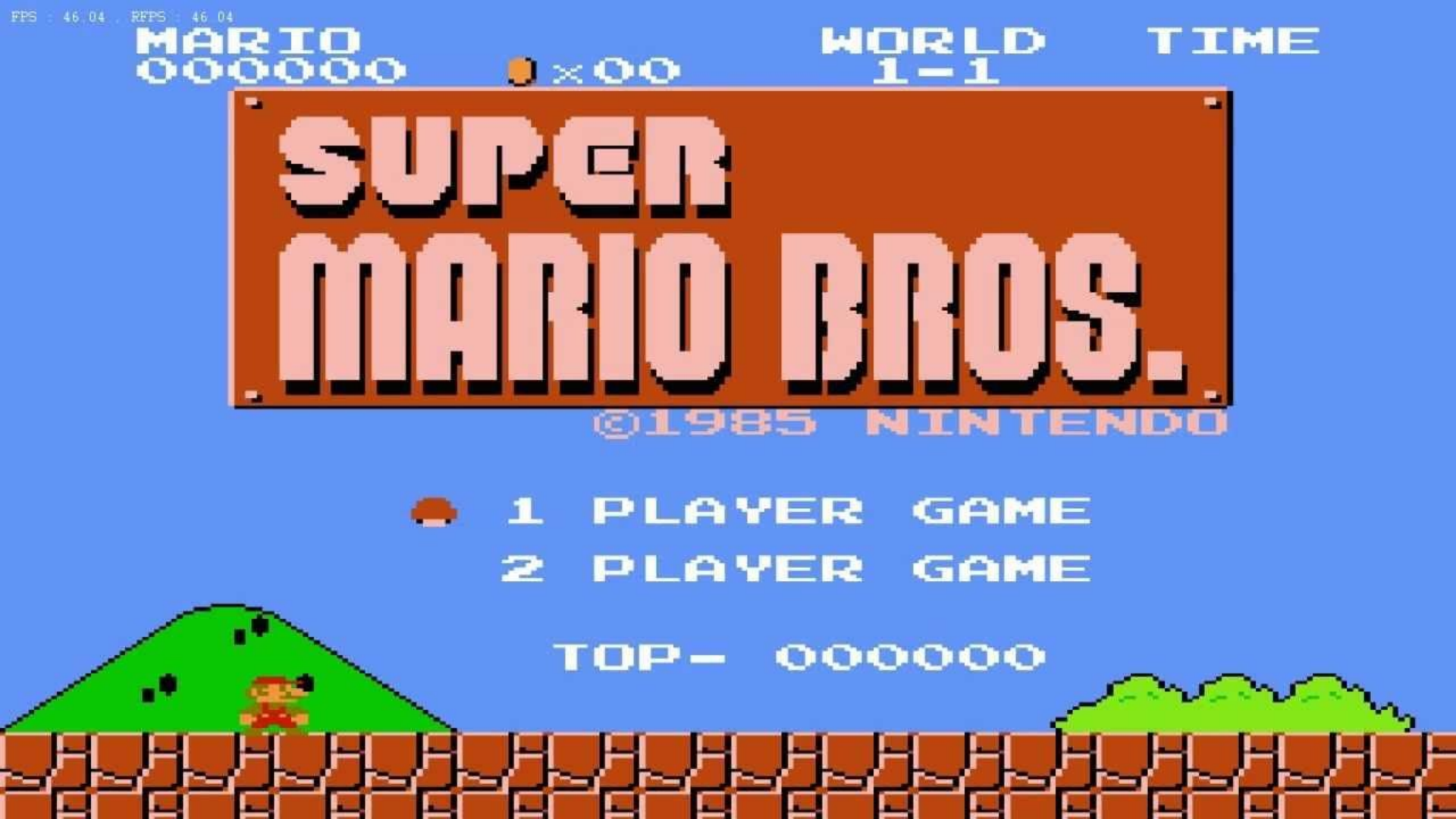
*

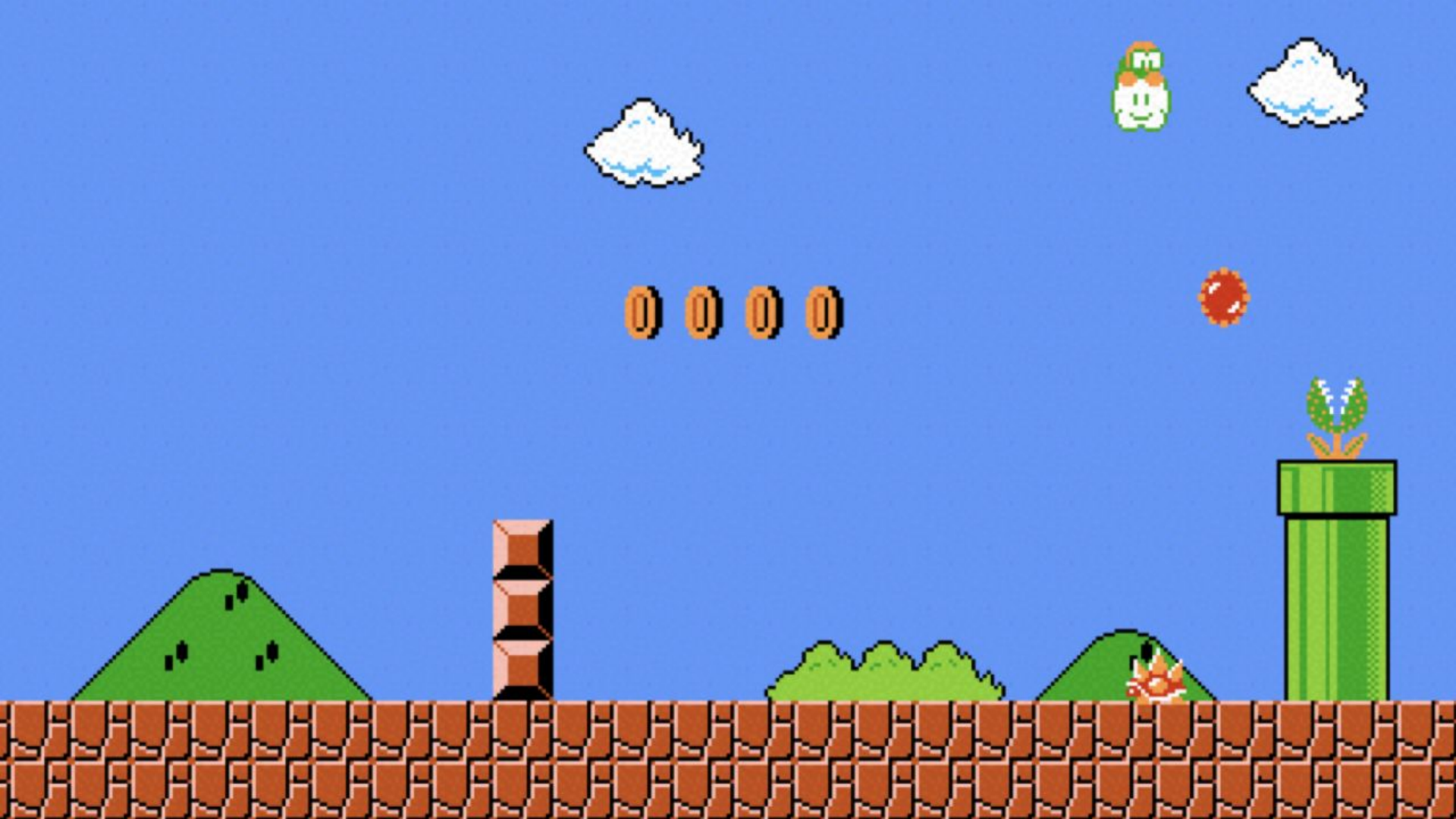
/

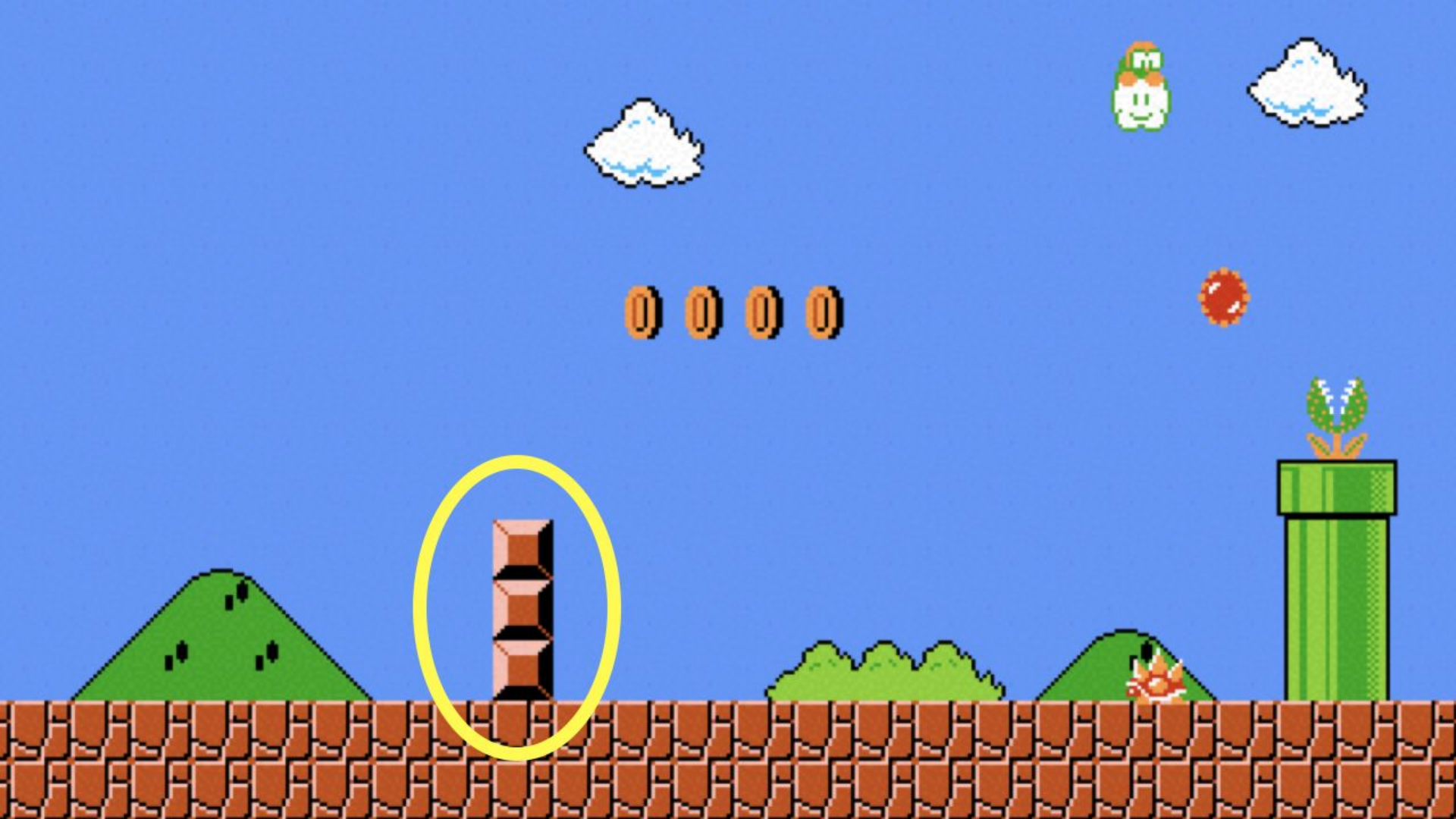
%

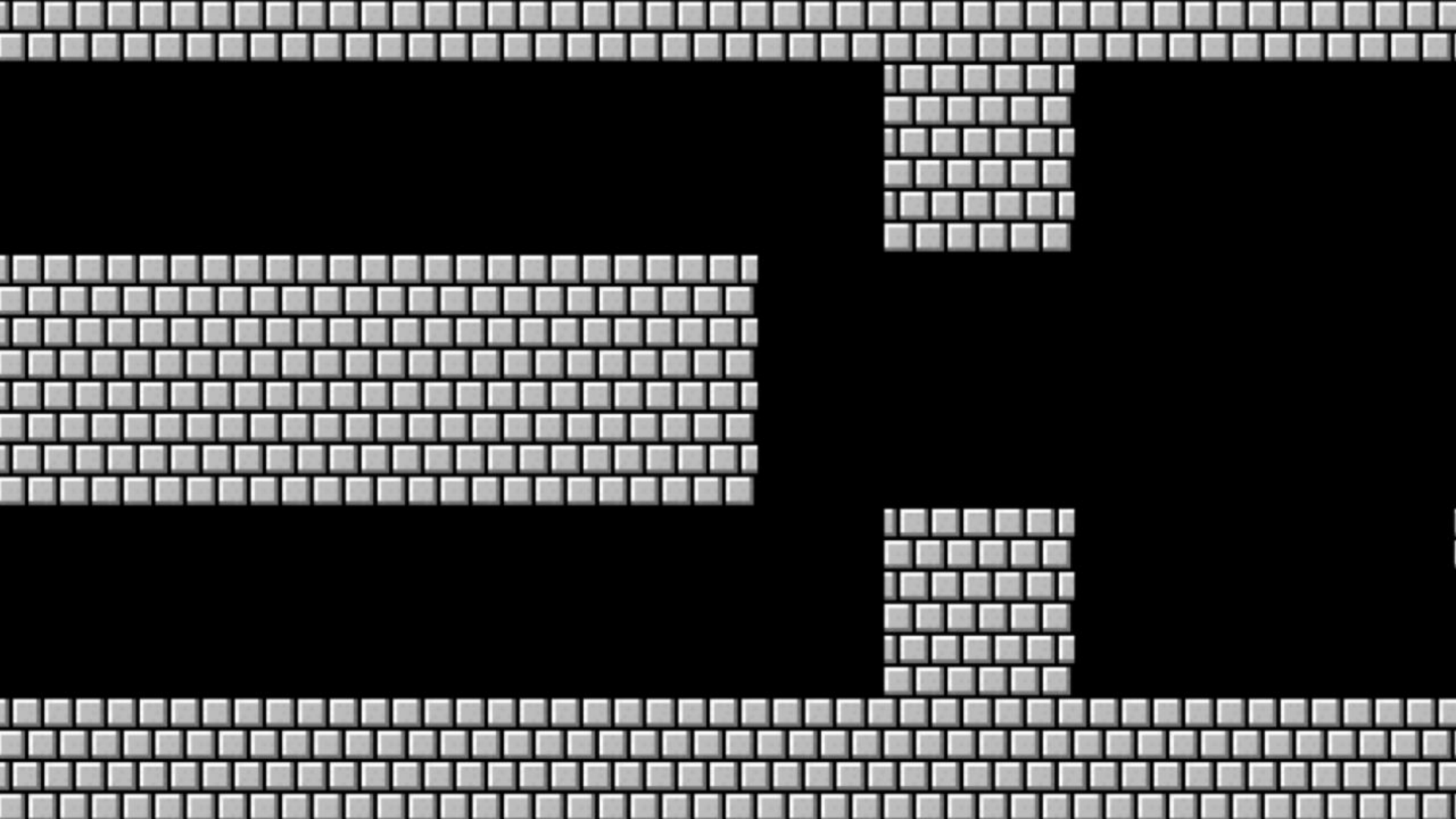
```
+  addition
-  subtraction
*  multiplication
/  division
%  remainder
```

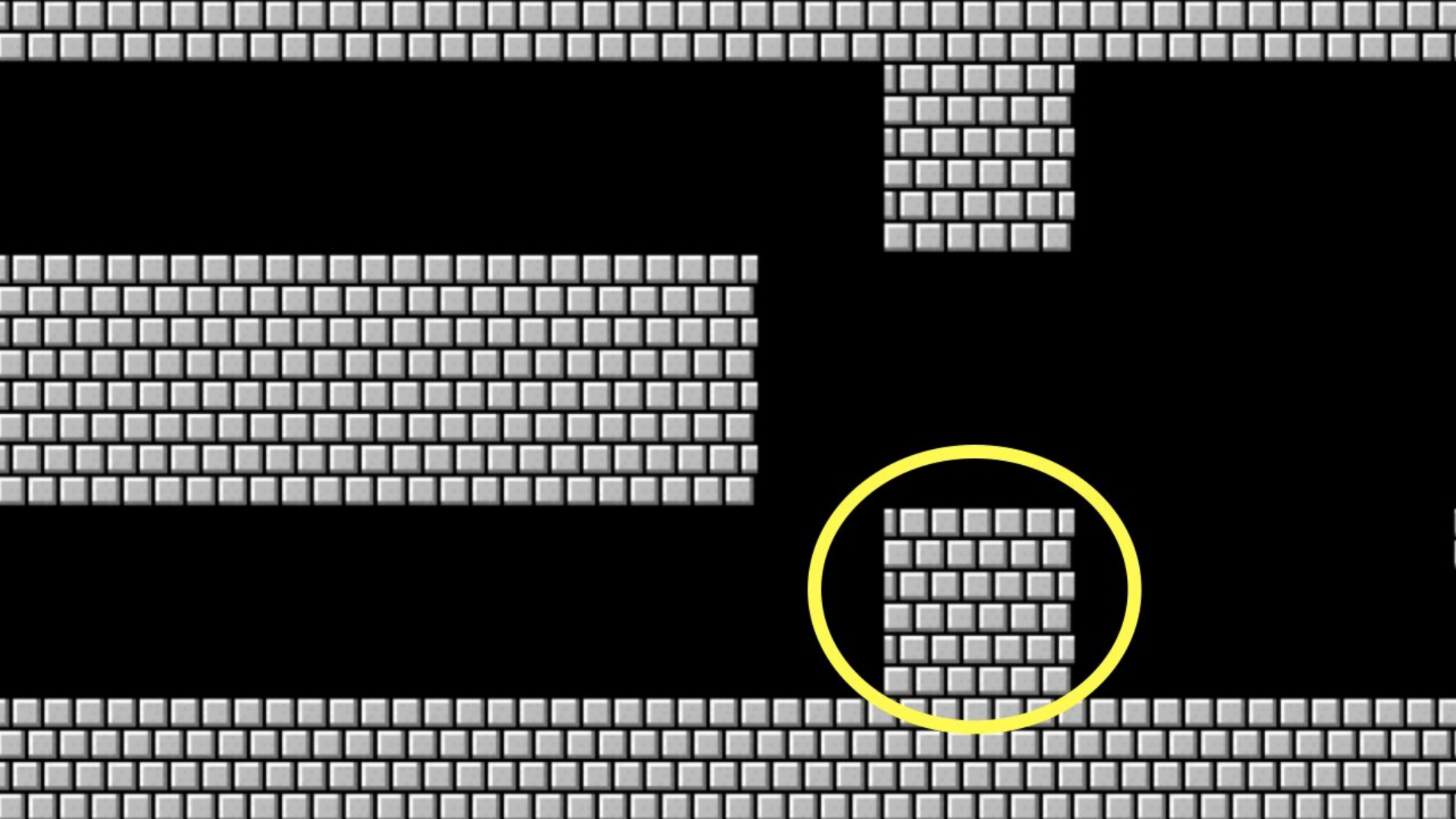
manual pages











CS50 Lab

lab.cs50.io


crucial
by Micron
8BBI2
D9HXT
8BBI2
D9HXT
4G85
4G85
4G85
47J6

floating-point imprecision

integer overflow

123

124

125

126

127

128

129

1

120

130

999

1

990

1

900

000

001

010

011

100

101

110

111

1

110

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integer overflow

1999

1999

1900

This is CS50