Introdução à Computação 2022.1

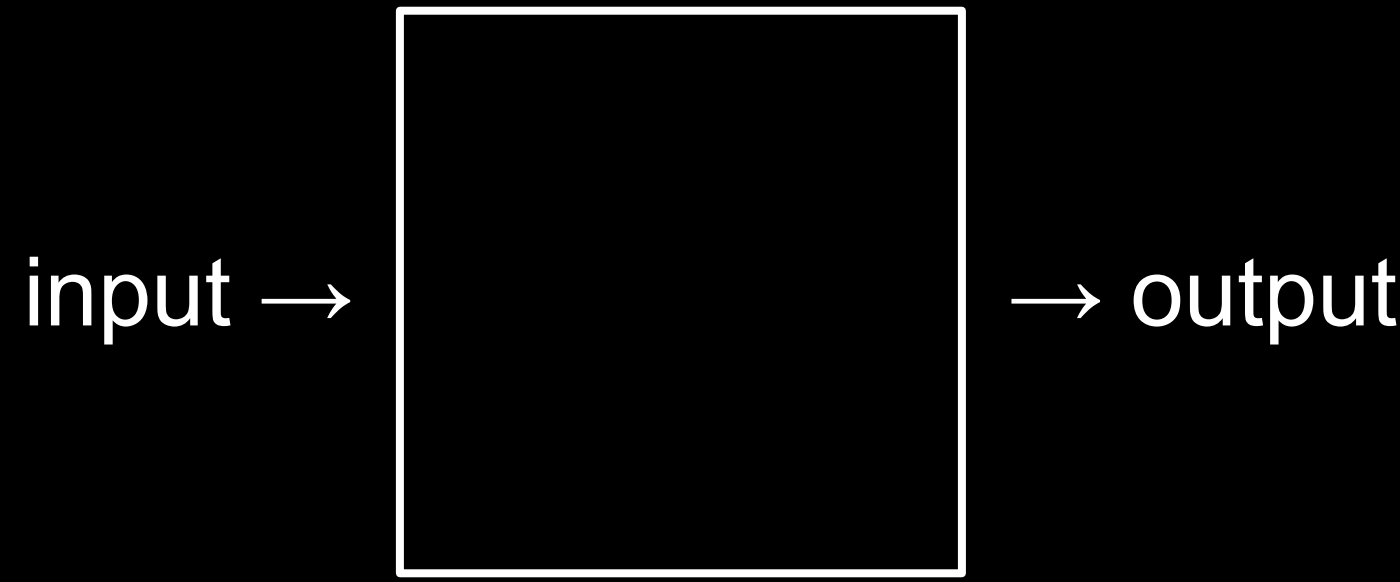
Alexandre Rademaker

Linguanges de Programação

http://rosettacode.org/wiki/Fibonacci_sequence

- Lisp
- C/C++
- Lean
- Haskell
- Python
- …

o que importa neste curso não é onde você termina em relação aos seus colegas, mas onde você termina em relação a si mesmo quando começou


input →
→ output

O curso

- https://github.com/emap-ic
- Iremos aprender a programar e para isso também sobre sistemas operacionais, editores, controle versão (git/GitHub), Docker etc
- entregas pelo GitHub
- trabalhos semanais e A1/A2
- Monitor
- Material Didático

000

001

010

011

100

101

110

111

123

123

10 1

123


100 10 1
123

100 10 1

123

100 × 1

100 10 1

123

100 × 1 + 10 × 2

100 10 1

123

100 × 1 + 10 × 2 + 1 × 3

100 10 1

123

100 + 20 + 3

123

100 10 1

###

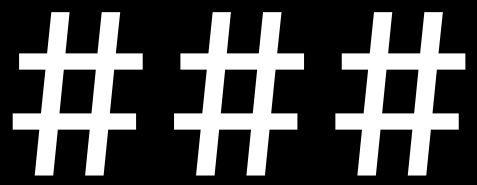
10^2 10^1 10^0

###

2^2 2^1 2^0

###

4 2 1




4 2 1
000

4 2 1

001

4 2 1

0 1 0

4 2 1

011

4 2 1

100

4 2 1

101

4 2 1

110

4 2 1

111

A

65

01000001

ASCII

...	A	B	C	D	E	F	G	H	I	...
...	65	66	67	68	69	70	71	72	73	...

72 73 33

H I

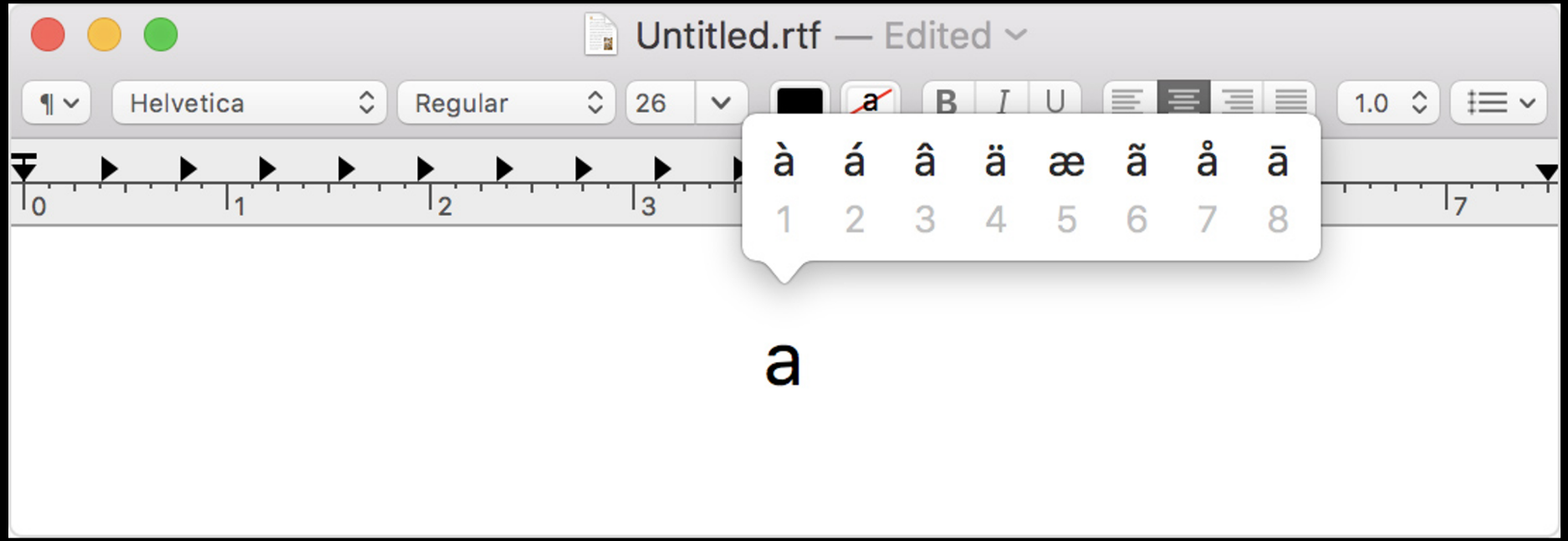
72 73 33

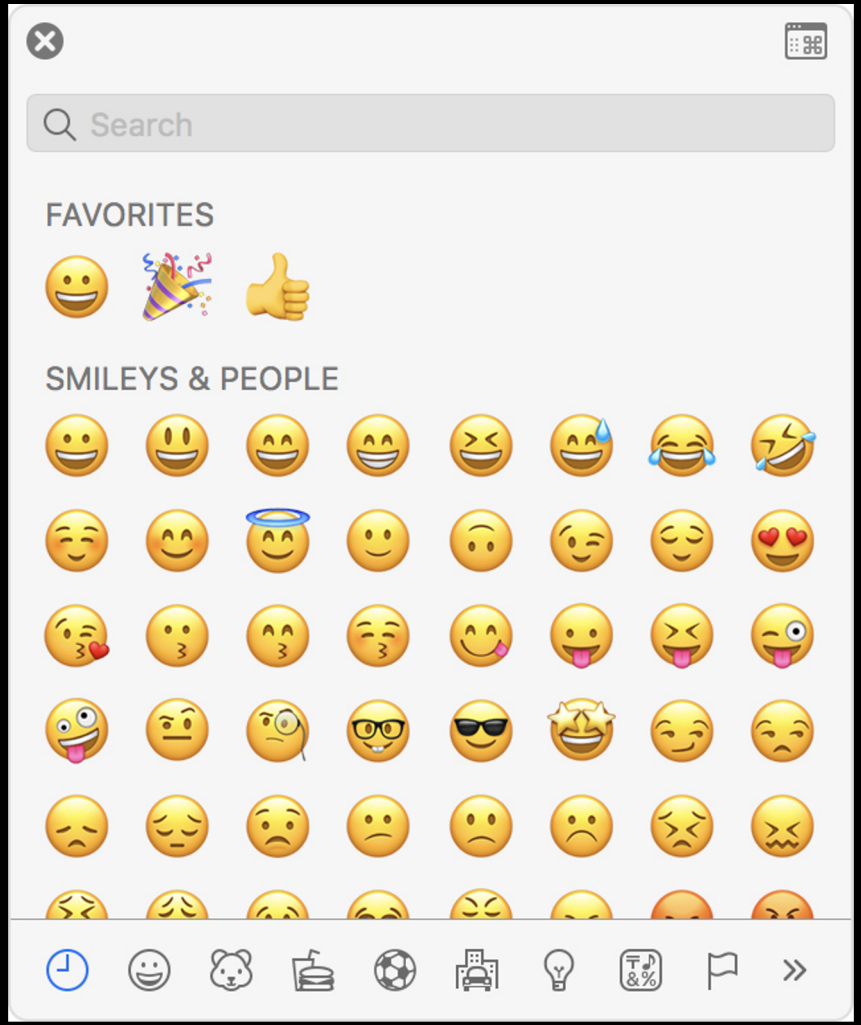
H	I	!
72	73	33

0	NUL	16	DLE	32	SP	48	0	64	@	80	P	96	`	112	p
1	SOH	17	DC1	33	!	49	1	65	A	81	Q	97	a	113	q
2	STX	18	DC2	34	"	50	2	66	B	82	R	98	b	114	r
3	ETX	19	DC3	35	#	51	3	67	C	83	S	99	c	115	s
4	EOT	20	DC4	36	$	52	4	68	D	84	T	100	d	116	t
5	ENQ	21	NAK	37	%	53	5	69	E	85	U	101	e	117	u
6	ACK	22	SYN	38	&	54	6	70	F	86	V	102	f	118	v
7	BEL	23	ETB	39	'	55	7	71	G	87	W	103	g	119	w
8	BS	24	CAN	40	(	56	8	72	H	88	X	104	h	120	x
9	HT	25	EM	41	)	57	9	73	I	89	Y	105	i	121	y
10	LF	26	SUB	42	*	58	:	74	J	90	Z	106	j	122	z
11	VT	27	ESC	43	+	59	;	75	K	91	[	107	k	123	{
12	FF	28	FS	44	,	60	<	76	L	92	\	108	l	124	|
13	CR	29	GS	45	-	61	=	77	M	93	]	109	m	125	}
14	SO	30	RS	46	.	62	>	78	N	94	^	110	n	126	~
15	SI	31	US	47	/	63	?	79	O	95	_	111	o	127	DEL

H	I	!
72	73	33

H	I	!
01001000	01001001	00100001


Untitled.rtf — Edited
Helvetica
Regular
26
1.0
à á â ä æ ã å ā
1 2 3 4 5 6 7 8
a

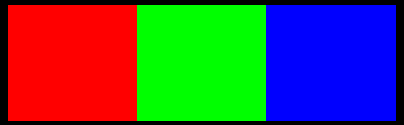

Search
FAVORITES
SMILEYS & PEOPLE

Unicode

11110000 10011111 10011000 10110111

Imagens

RGB



72 73 33

https://en.wikipedia.org/wiki/RGB_color_model

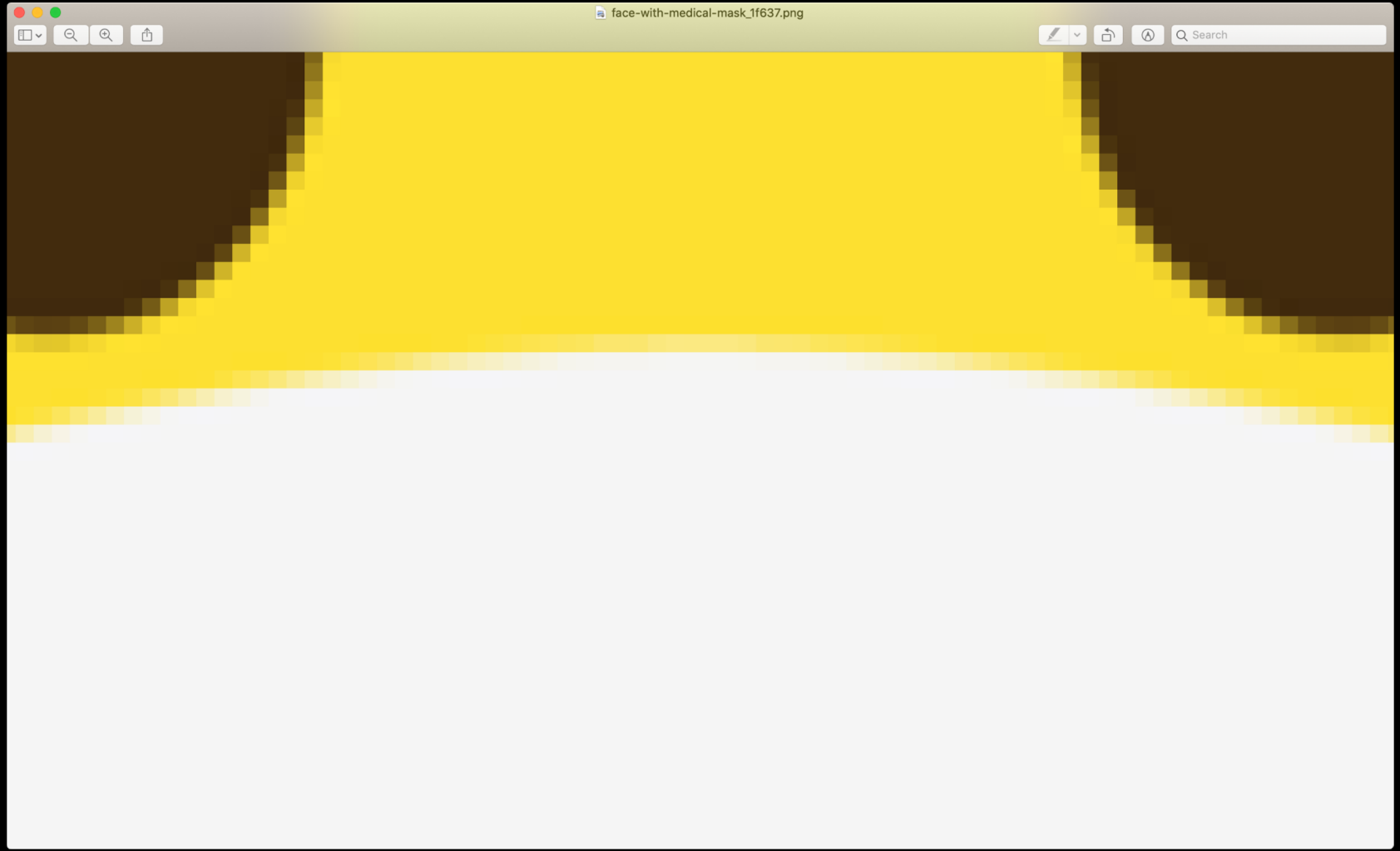

72
73
33

face-with-medical-mask_1f637.png

Search

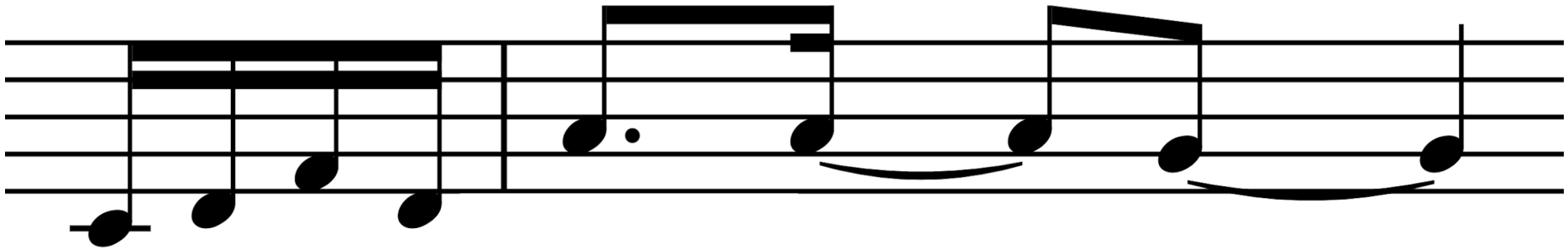
face-with-medical-mask_1f637.png

Search


face-with-medical-mask_1f637.png
Search

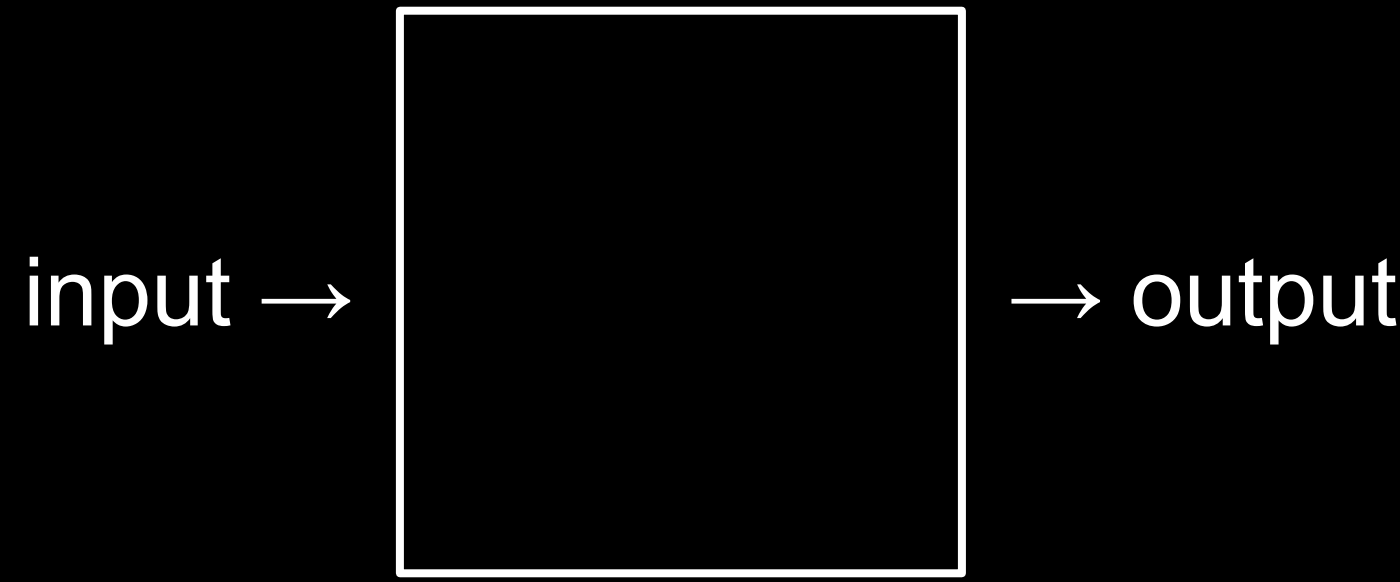
Vídeos

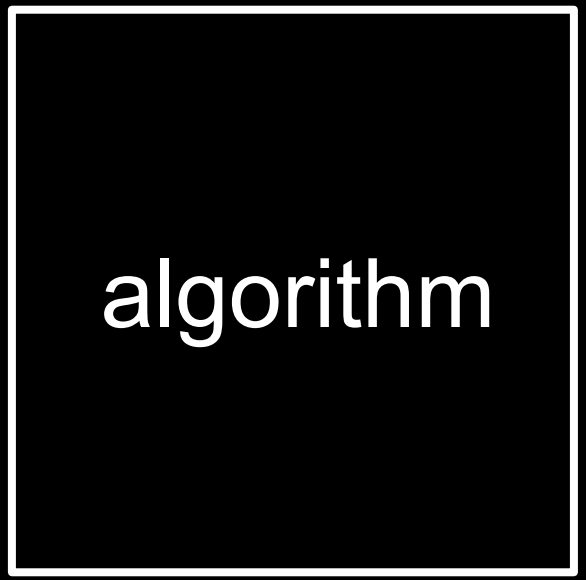
Música

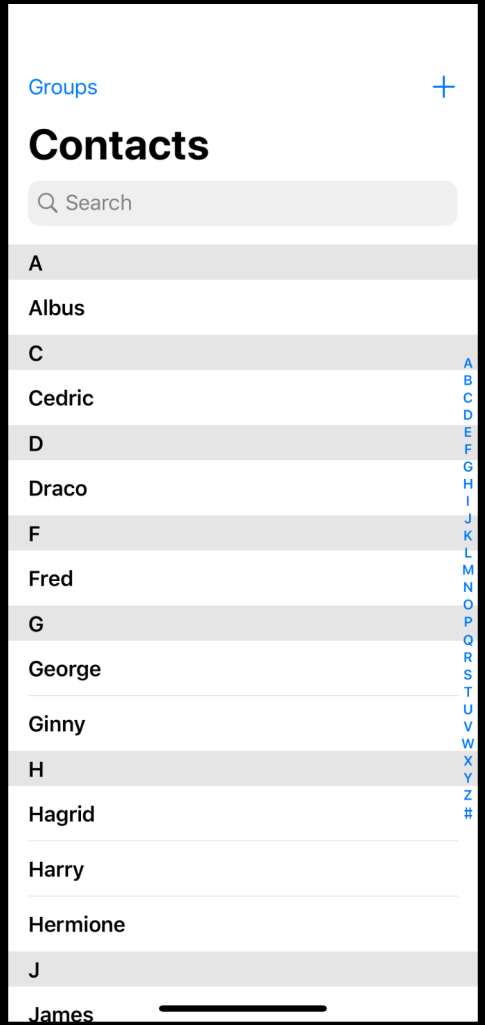


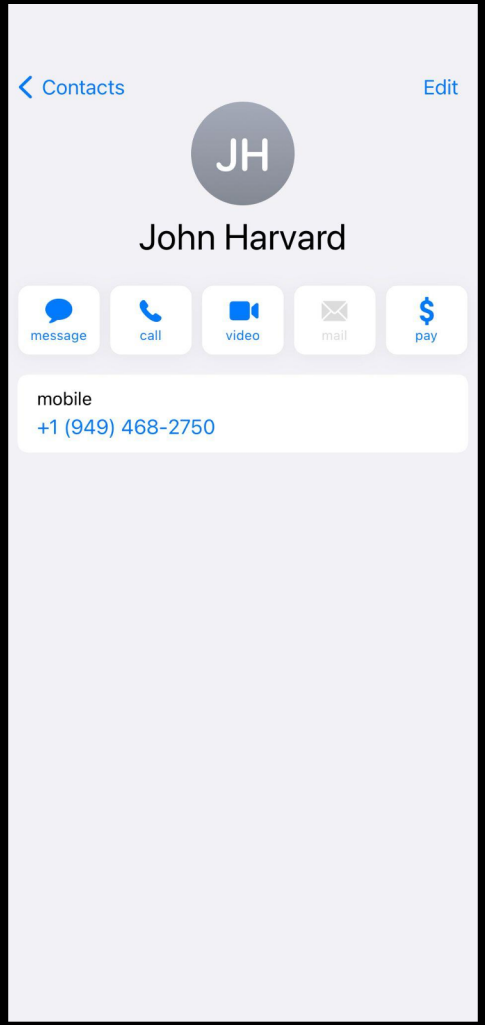
```
144 60 64
128 60 64
144 62 64
128 62 64
144 65 64
128 65 64
144 62 64
128 62 64
144 69 64
128 69 64
144 69 64
128 69 64
144 67 64
128 67 64
```

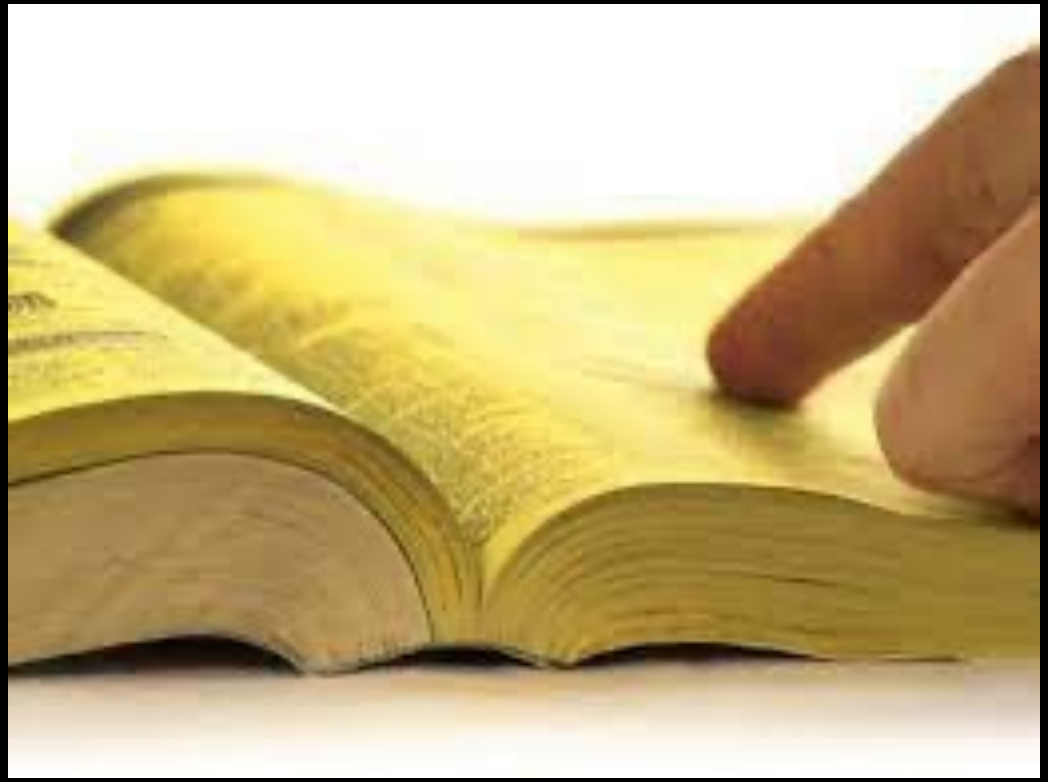
https://en.wikipedia.org/wiki/MIDI

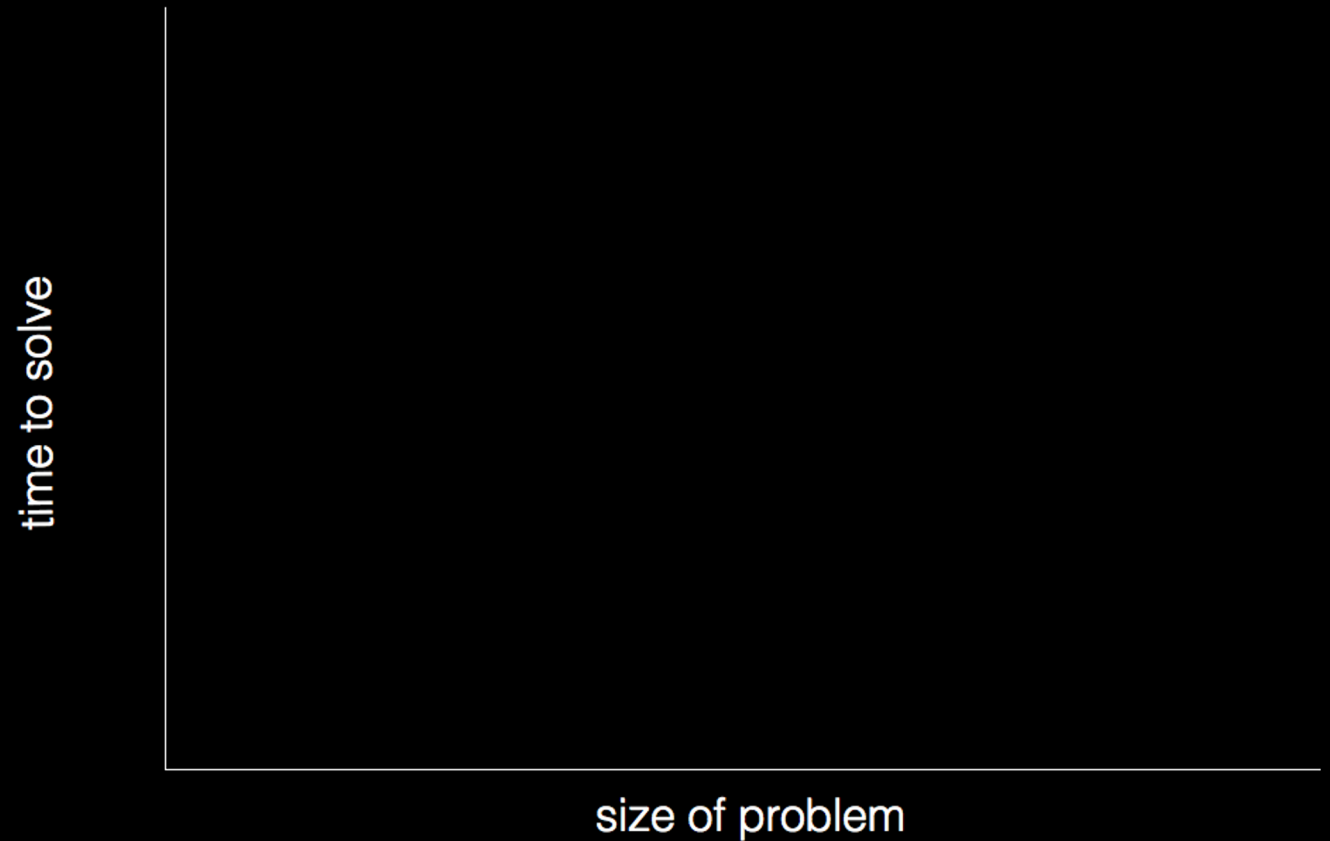

input →
→ output

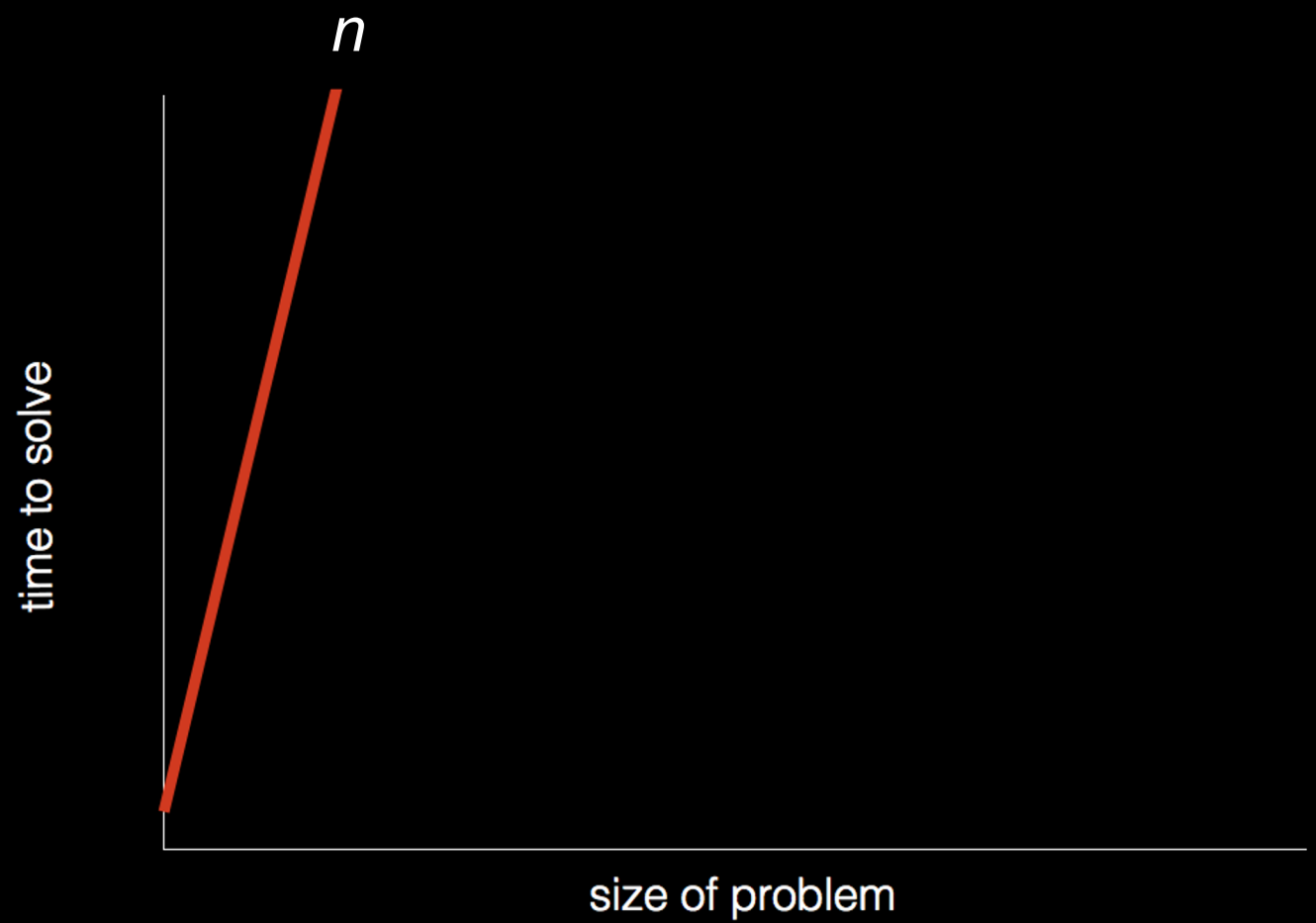

algorithm

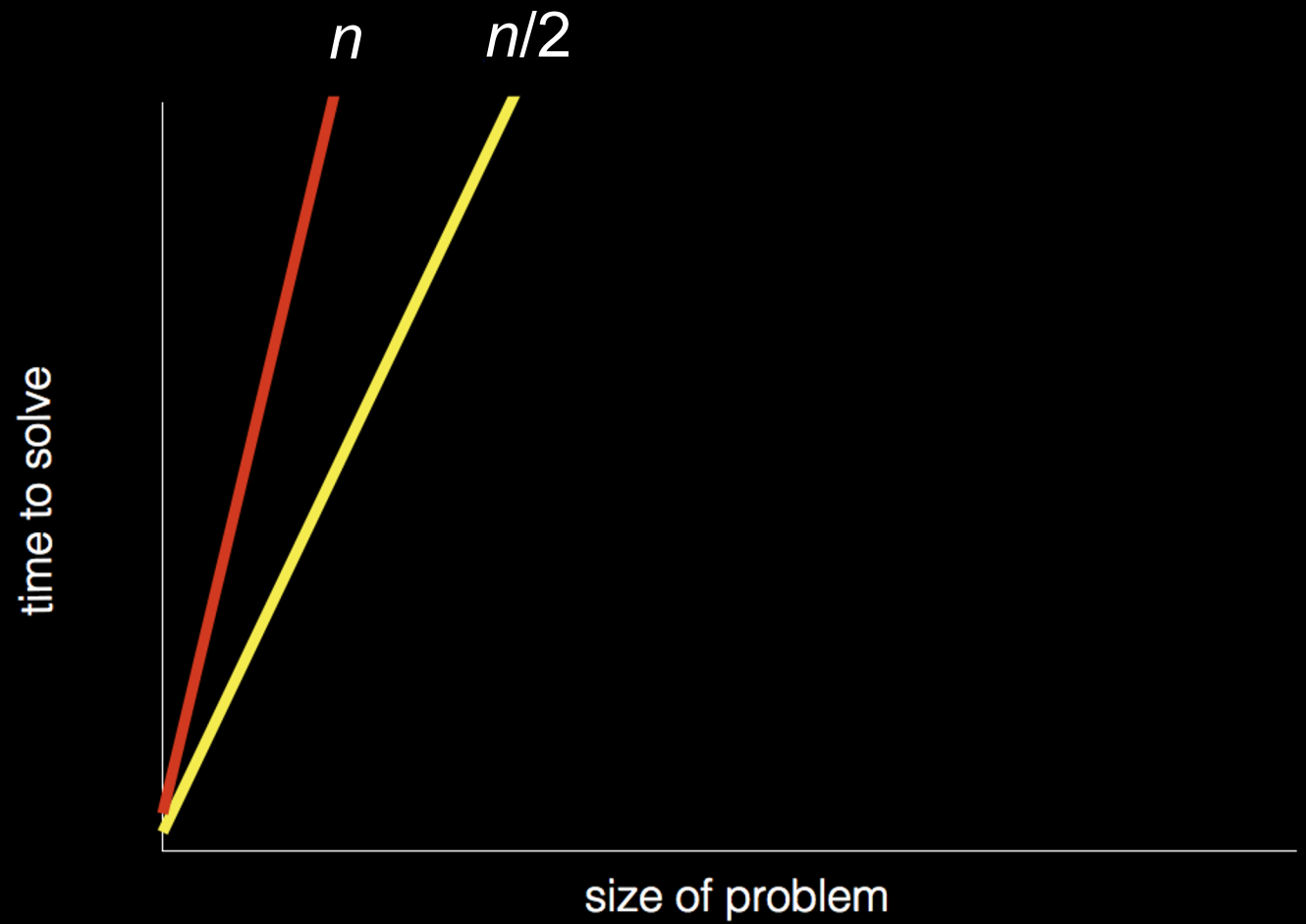

Groups
Contacts
Search
A
Albus
C
Cedric
D
Draco
F
Fred
G
George
Ginny
H
Hagrid
Harry
Hermione
J
James
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z #

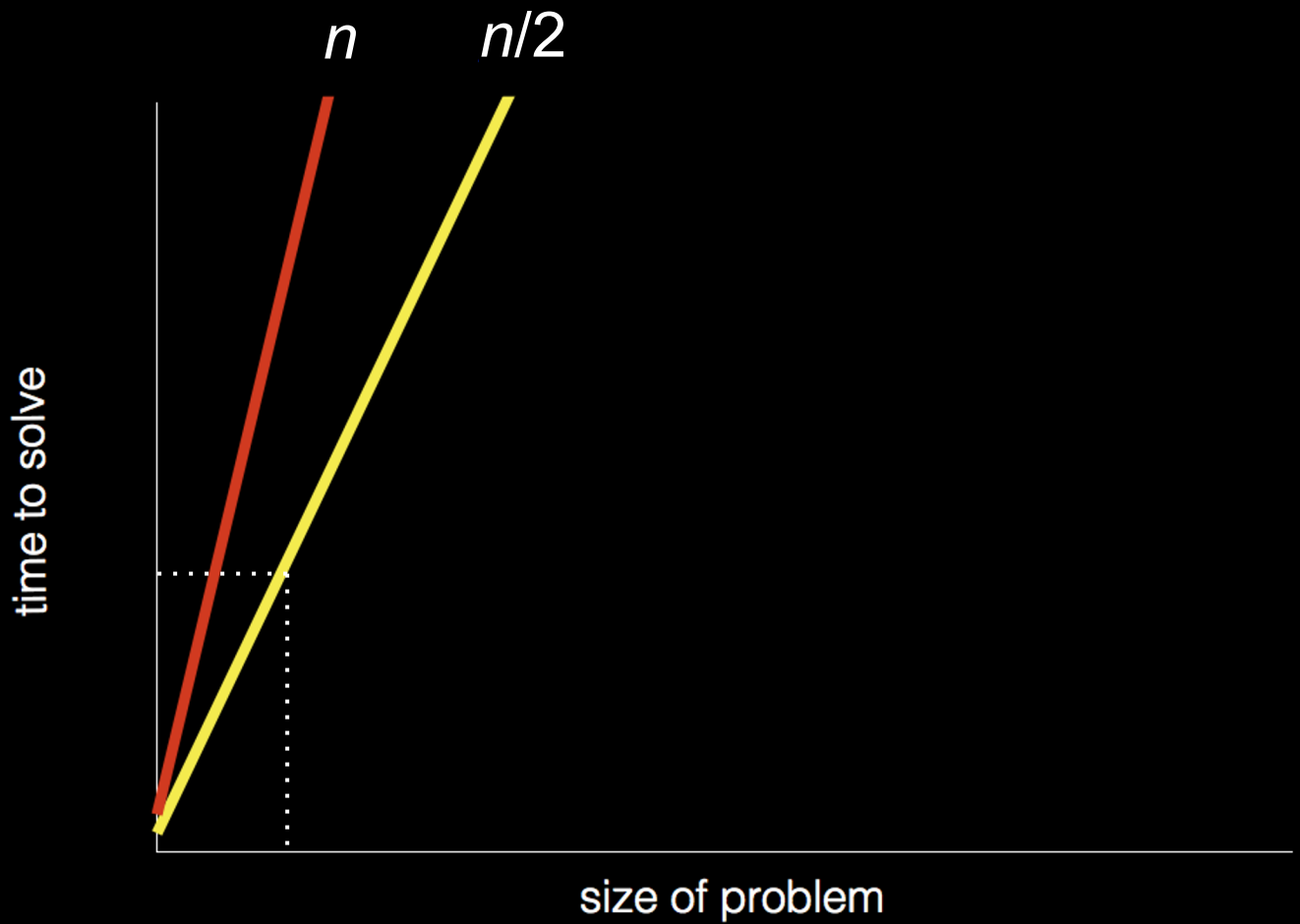

Contacts
Edit
JH
John Harvard
message
call
video
mail
pay
mobile
+1 (949) 468-2750

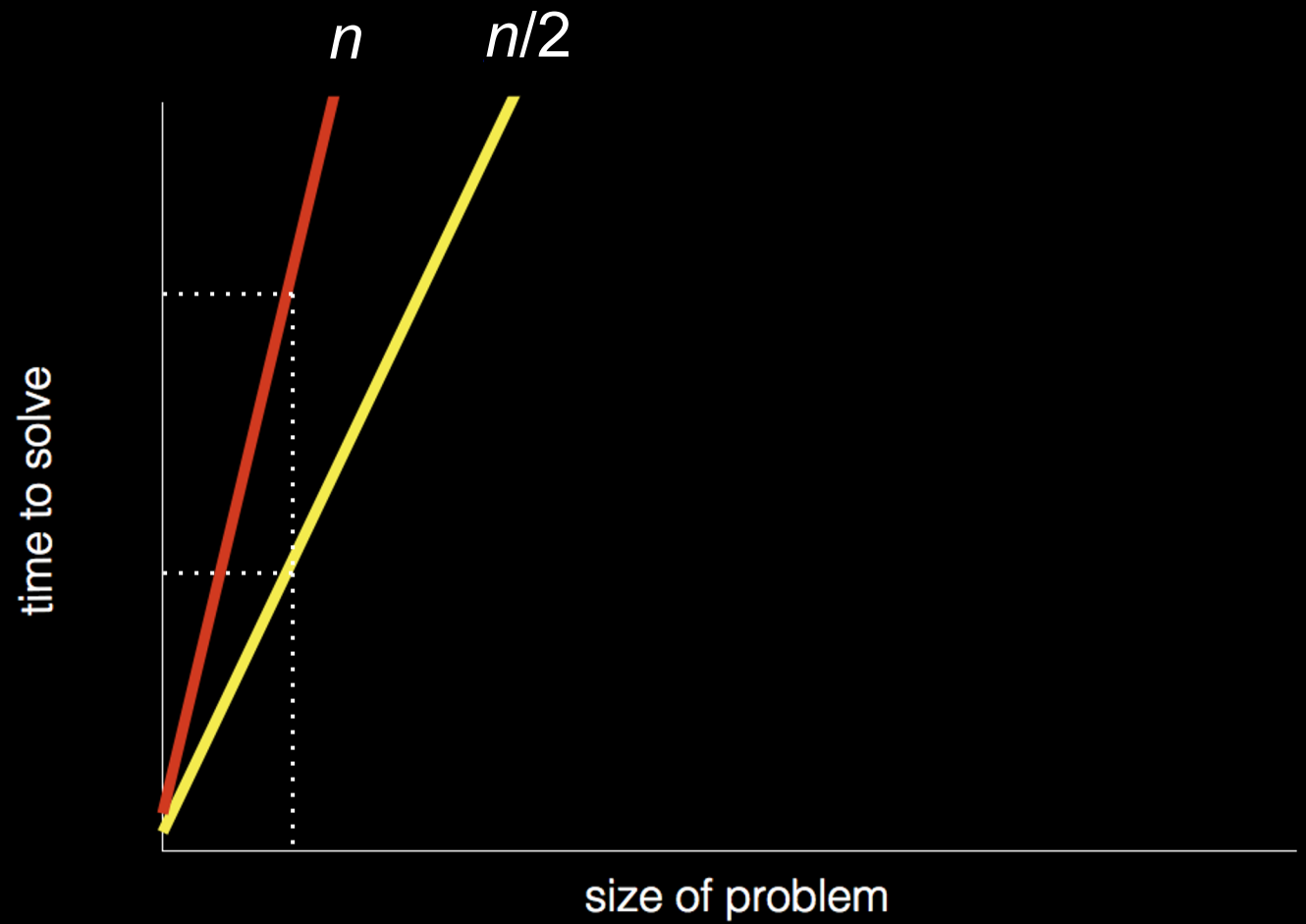


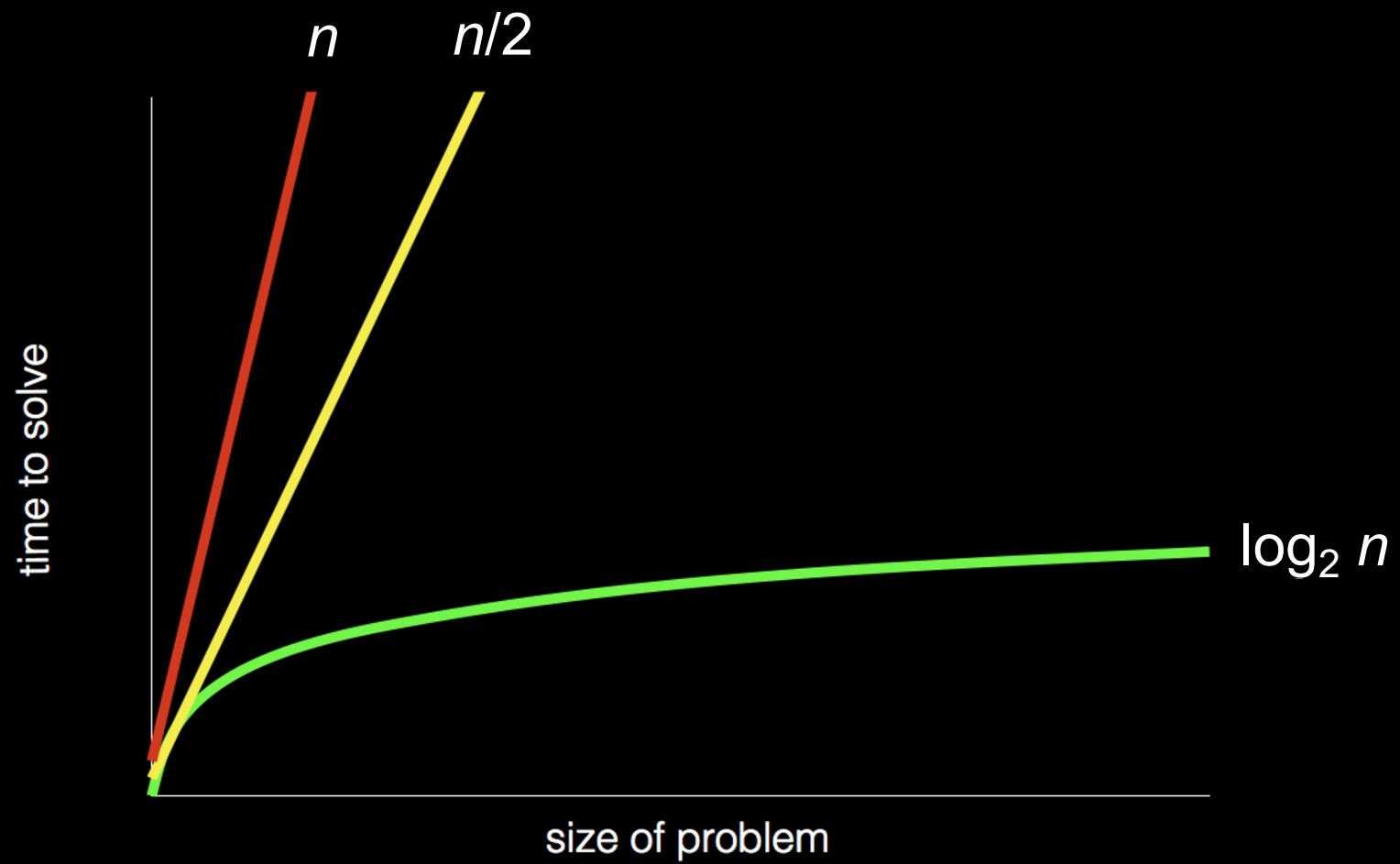

time to solve
size of problem


n
time to solve
size of problem


n
n/2
time to solve
size of problem


n
n/2
time to solve
size of problem


n
n/2
time to solve
size of problem


n
n/2
time to solve
log2 n
size of problem

pseudocode

```
1   Pick up phone book
2   Open to middle of phone book
3   Look at page
4   If person is on page
5       Call person
6   Else if person is earlier in book
7       Open to middle of left half of book
8       Go back to line 3
9   Else if person is later in book
10      Open to middle of right half of book
11      Go back to line 3
12  Else
13      Quit
```

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13      Quit
```

funções

```
1   Pick up phone book
2   Open to middle of phone book
3   Look at page
4   If person is on page
5       Call person
6   Else if person is earlier in book
7       Open to middle of left half of book
8       Go back to line 3
9   Else if person is later in book
10      Open to middle of right half of book
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12  Else
13      Quit
```

condicionais

```
1   Pick up phone book
2   Open to middle of phone book
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6   Else if person is earlier in book
7       Open to middle of left half of book
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```

Expressões lógicas

```
1   Pick up phone book
2   Open to middle of phone book
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11      Go back to line 3
12  Else
13      Quit
```

Loops / repetições

- functions
  - arguments, return values
- conditionals
- Boolean expressions
- loops
- variables
- ...

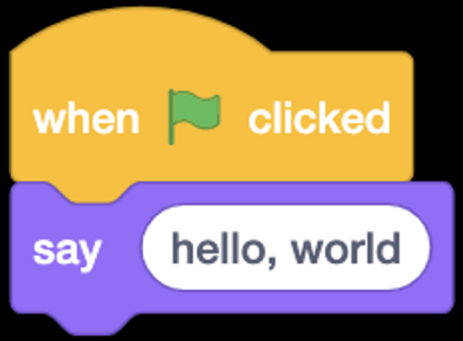
```c
#include <stdio.h>

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

Exemplo C

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

Exemplo Python



https://scratch.mit.edu

Code Costumes Sounds

Motion
Looks
Sound
Events
Control
Sensing
Operators
Variables
My Blocks

Motion

move 10 steps
turn 15 degrees
turn 15 degrees

go to random position
go to x: 0 y: 0
glide 1 secs to random position
glide 1 secs to x: 0 y: 0

point in direction 90
point towards mouse-pointer

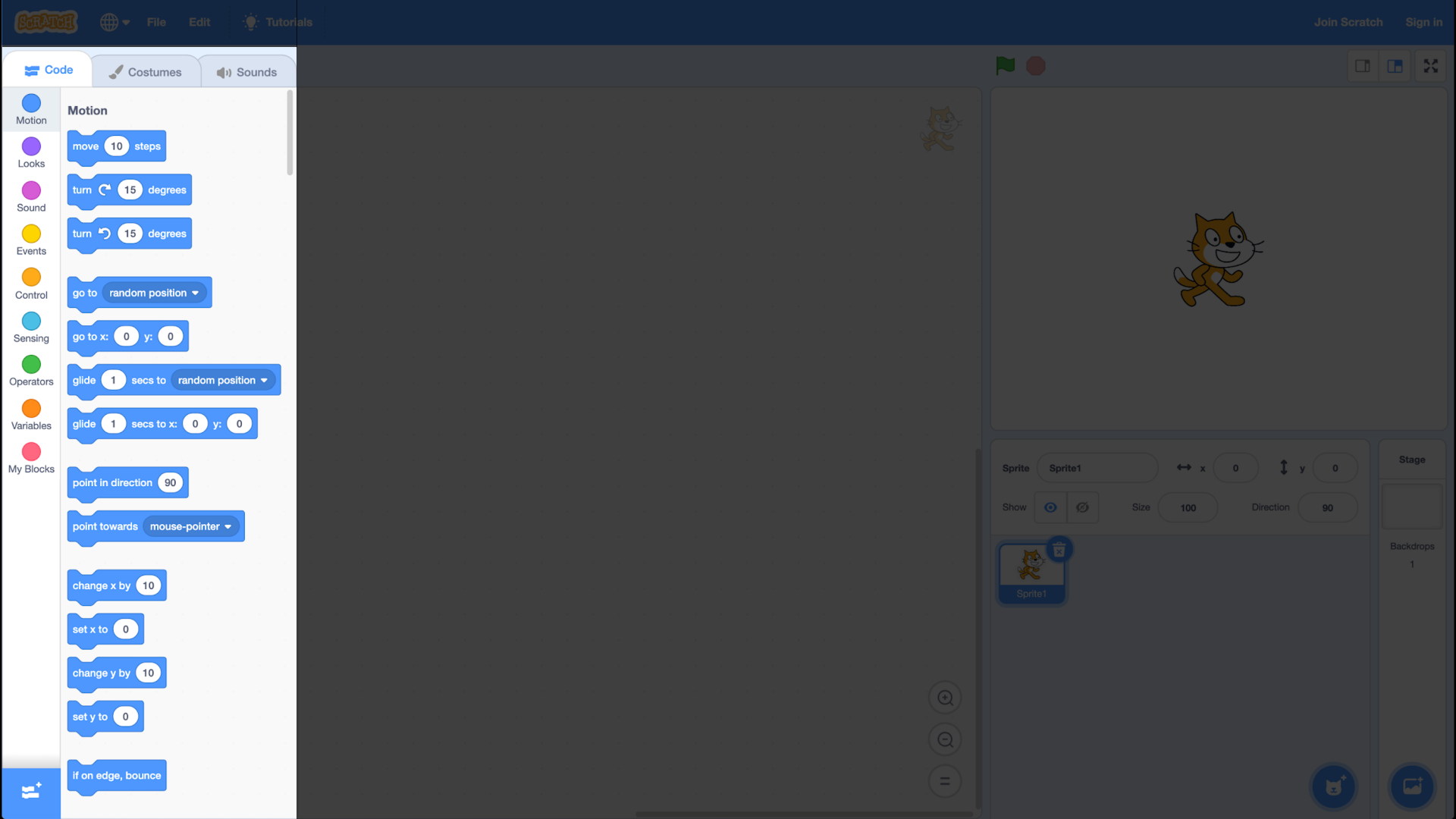
change x by 10
set x to 0
change y by 10
set y to 0

if on edge, bounce

Sprite Sprite1 x 0 y 0
Show Size 100 Direction 90


Sprite1

Stage
Backdrops 1


File
Edit
Tutorials
Join Scratch
Sign in
Code
Costumes
Sounds
Motion
Looks
Sound
Events
Control
Sensing
Operators
Variables
My Blocks
Motion
move 10 steps
turn 15 degrees
turn 15 degrees
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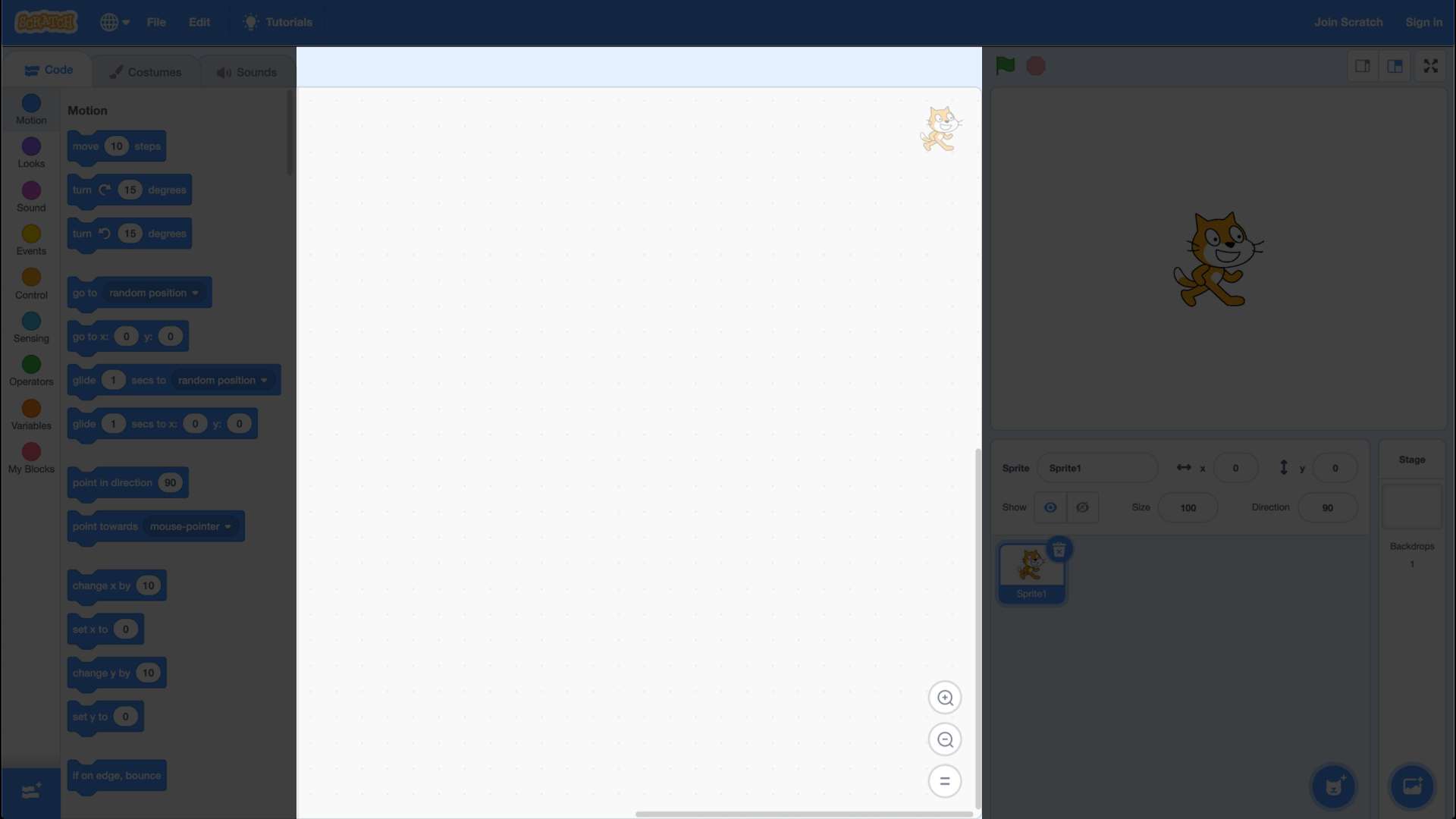
change x by 10
set x to 0
change y by 10
set y to 0
if on edge, bounce
Sprite
Sprite1
x 0
y 0
Show
Size 100
Direction 90
Stage
Backdrops 1
Sprite1


File
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Sign in
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Sounds
Motion
Looks
Sound
Events
Control
Sensing
Operators
Variables
My Blocks
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turn 15 degrees
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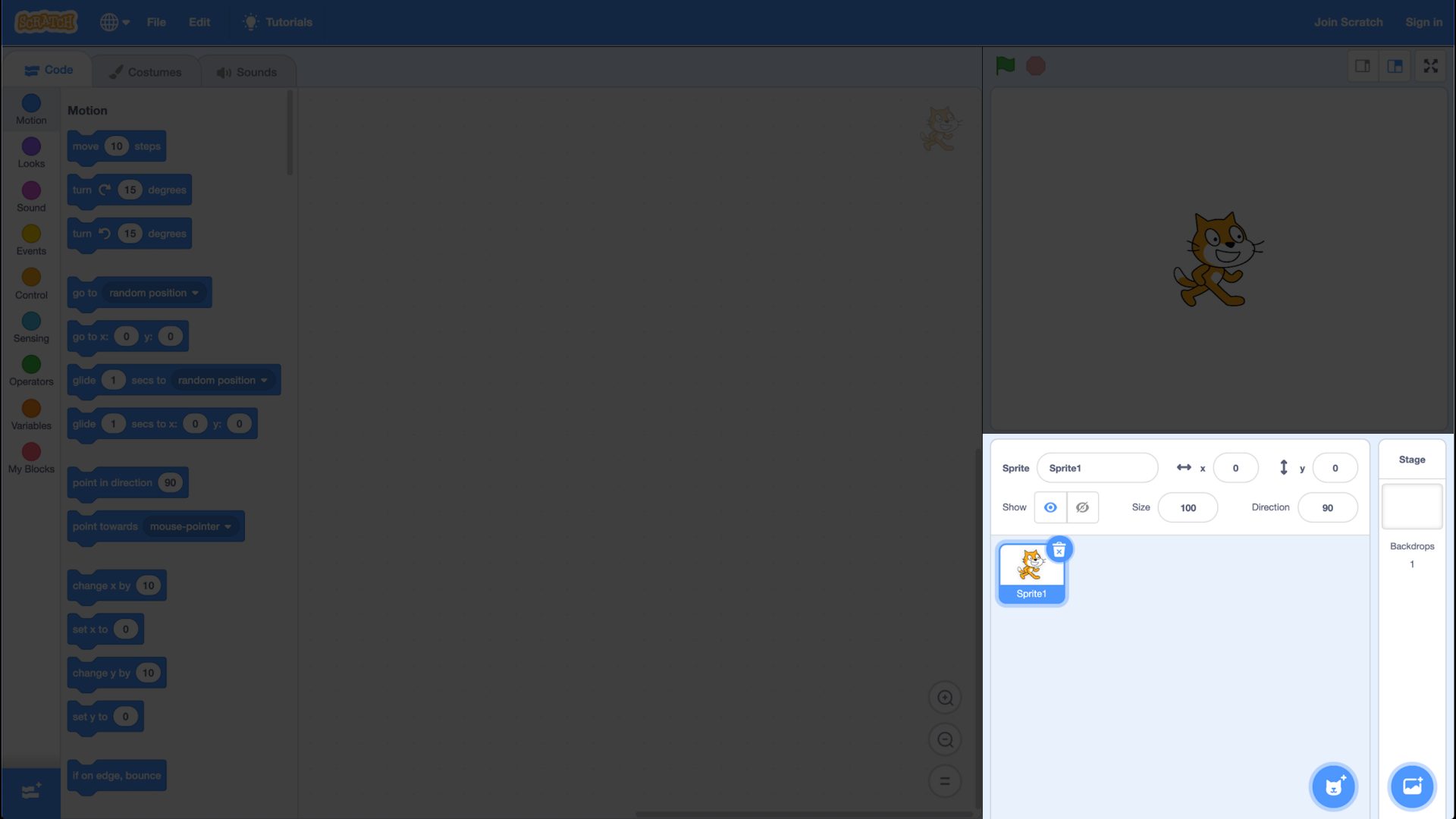
change y by 10
set y to 0
if on edge, bounce
Sprite
Sprite1
x 0
y 0
Show
Size 100
Direction 90
Stage
Backdrops 1
Sprite1


File
Edit
Tutorials
Join Scratch
Sign in
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Costumes
Sounds
Motion
Looks
Sound
Events
Control
Sensing
Operators
Variables
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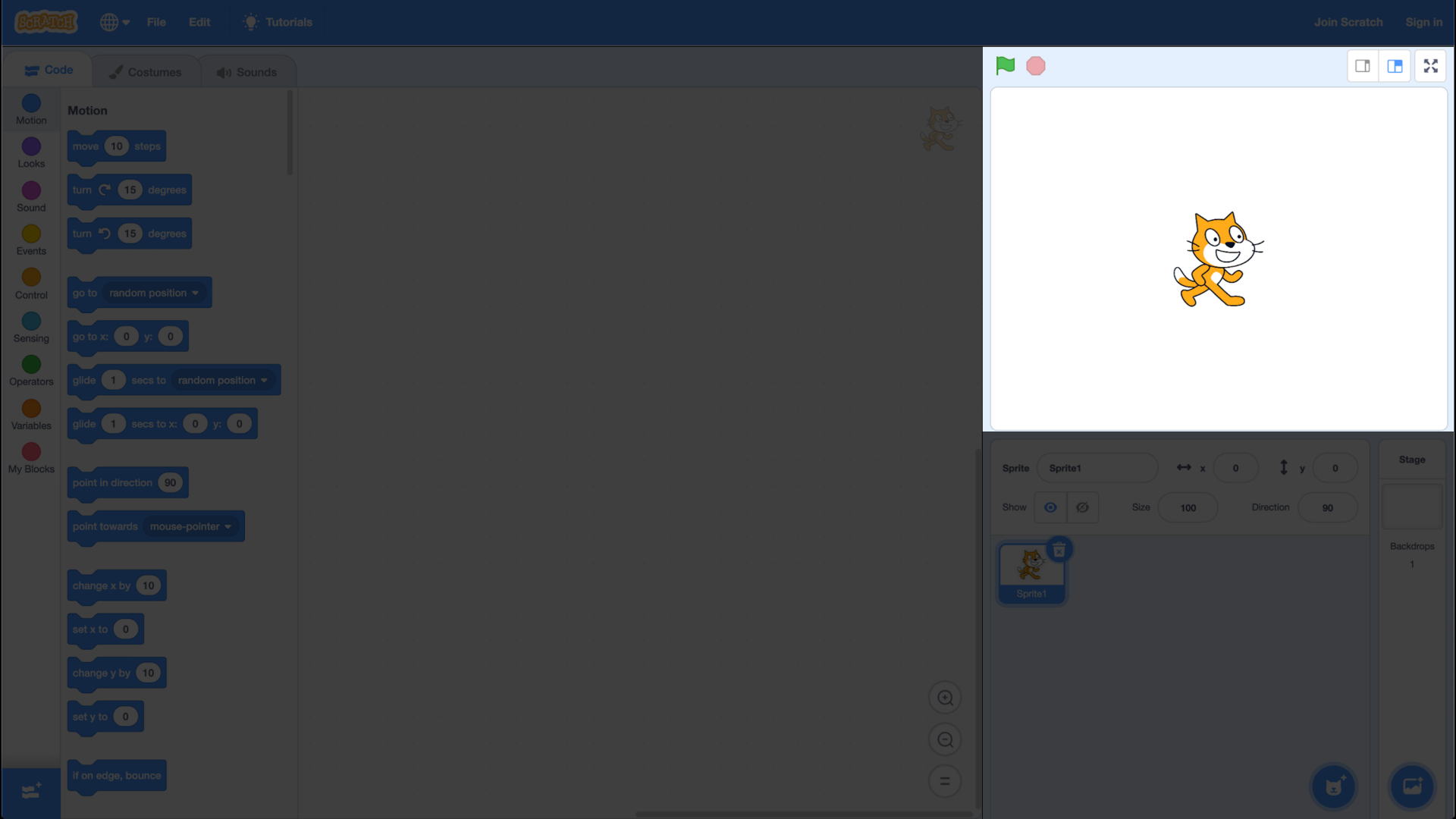
Sprite
Sprite1
x
0
y
0
Show
Size
100
Direction
90
Sprite1
Stage
Backdrops
1


File
Edit
Tutorials
Join Scratch
Sign in
Code
Costumes
Sounds
Motion
Looks
Sound
Events
Control
Sensing
Operators
Variables
My Blocks
Motion
move 10 steps
turn 15 degrees
turn 15 degrees
go to random position
go to x: 0 y: 0
glide 1 secs to random position
glide 1 secs to x: 0 y: 0
point in direction 90
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change x by 10
set x to 0
change y by 10
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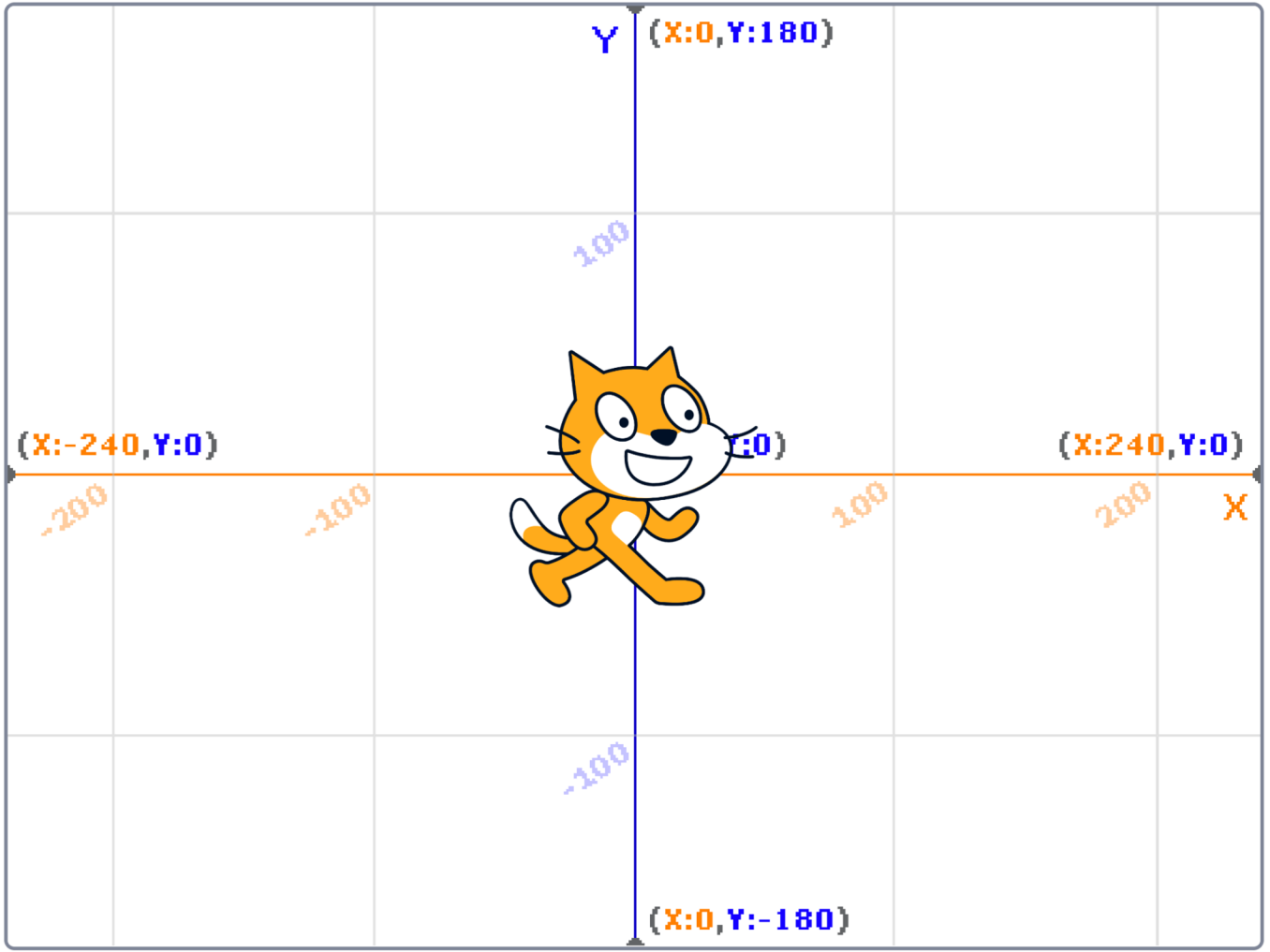
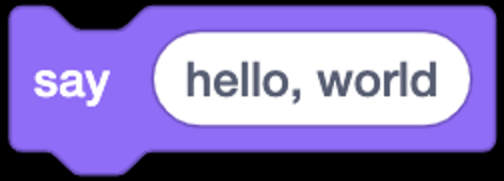
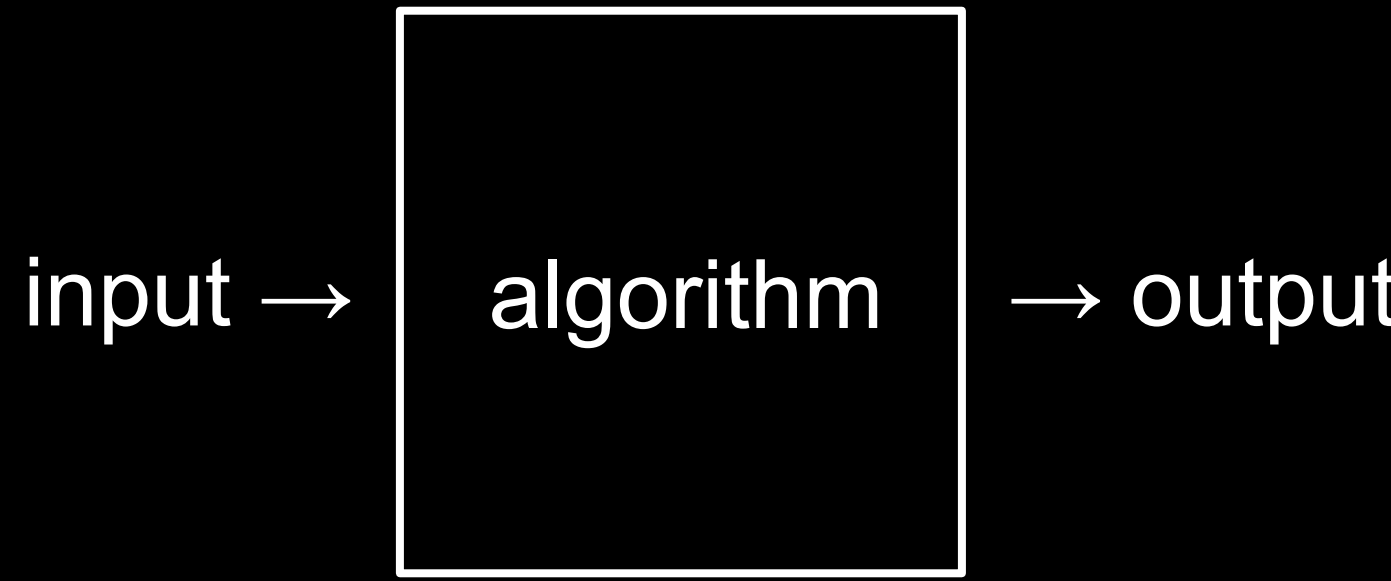
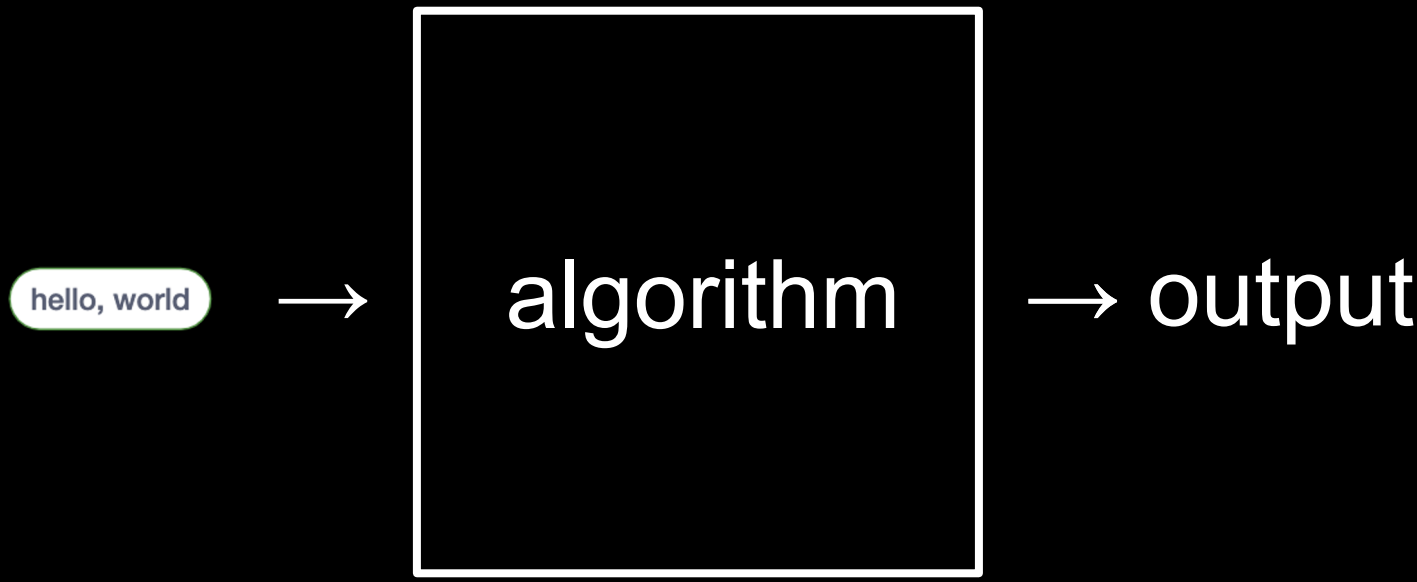
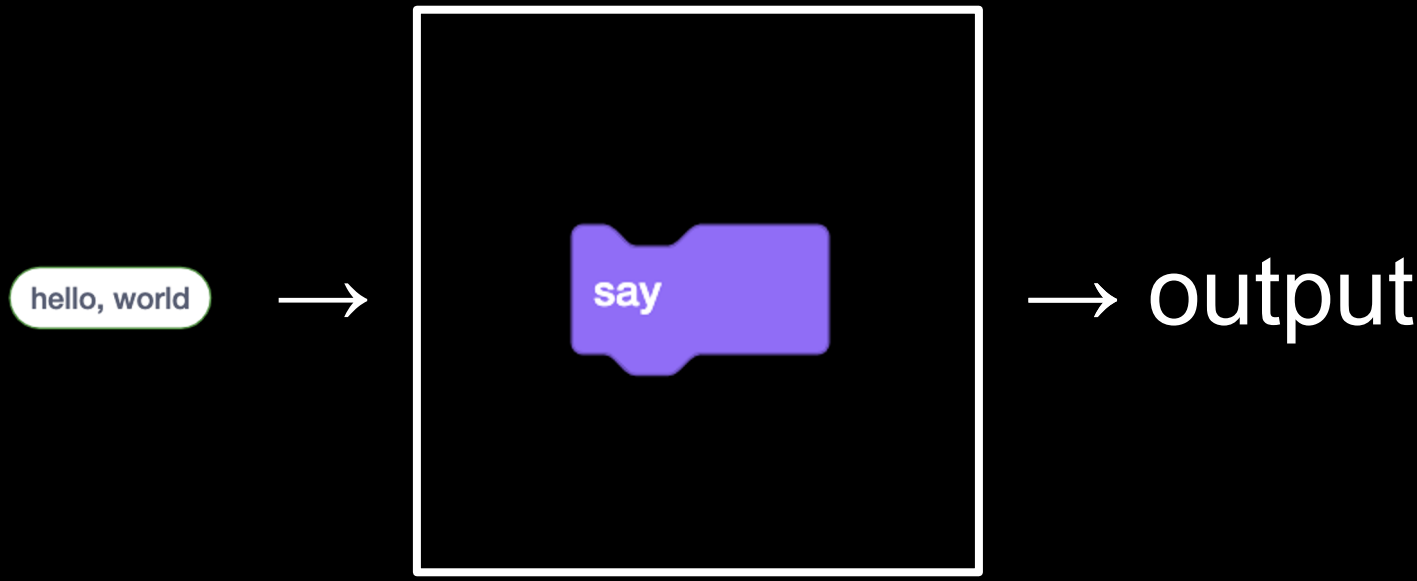
if on edge, bounce
Sprite
Sprite1
x
0
y
0
Show
Size
100
Direction
90
Stage
Backdrops
1
Sprite1

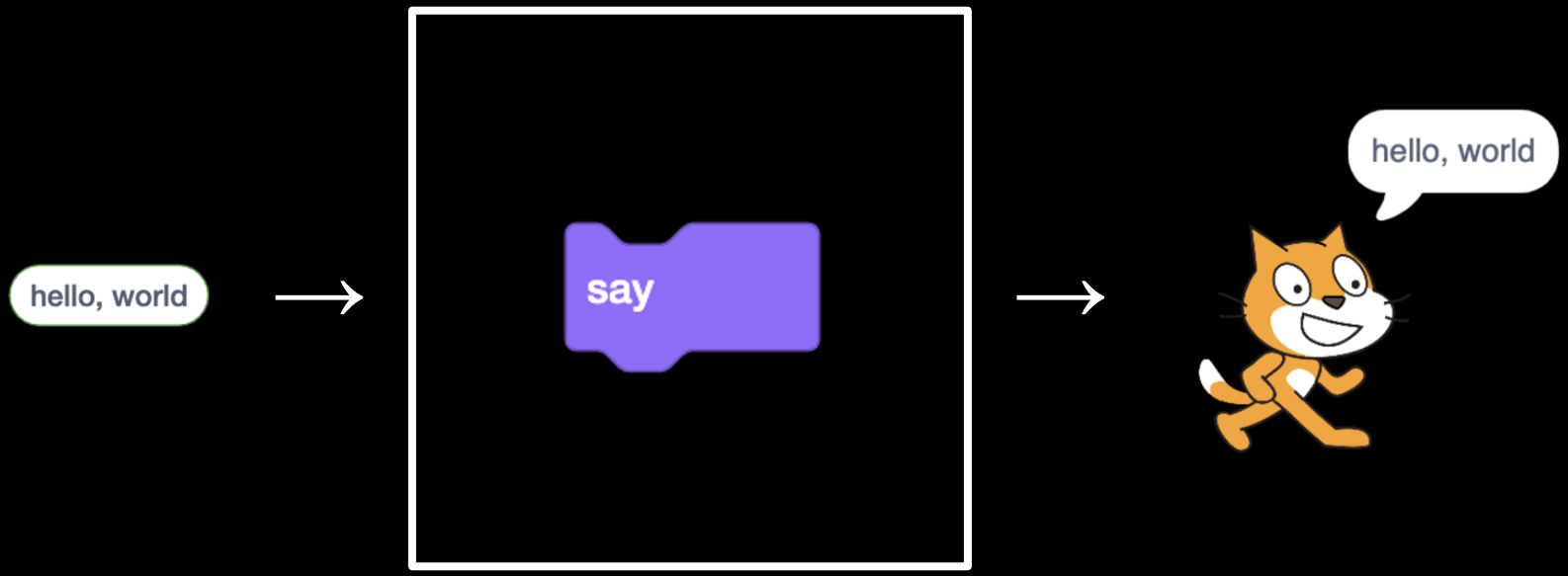

Y
(X:0,Y:180)
100
(X:-240,Y:0)
:0)
(X:240,Y:0)
-200
-100
100
200
X
-100
(X:0,Y:-180)


say
hello, world

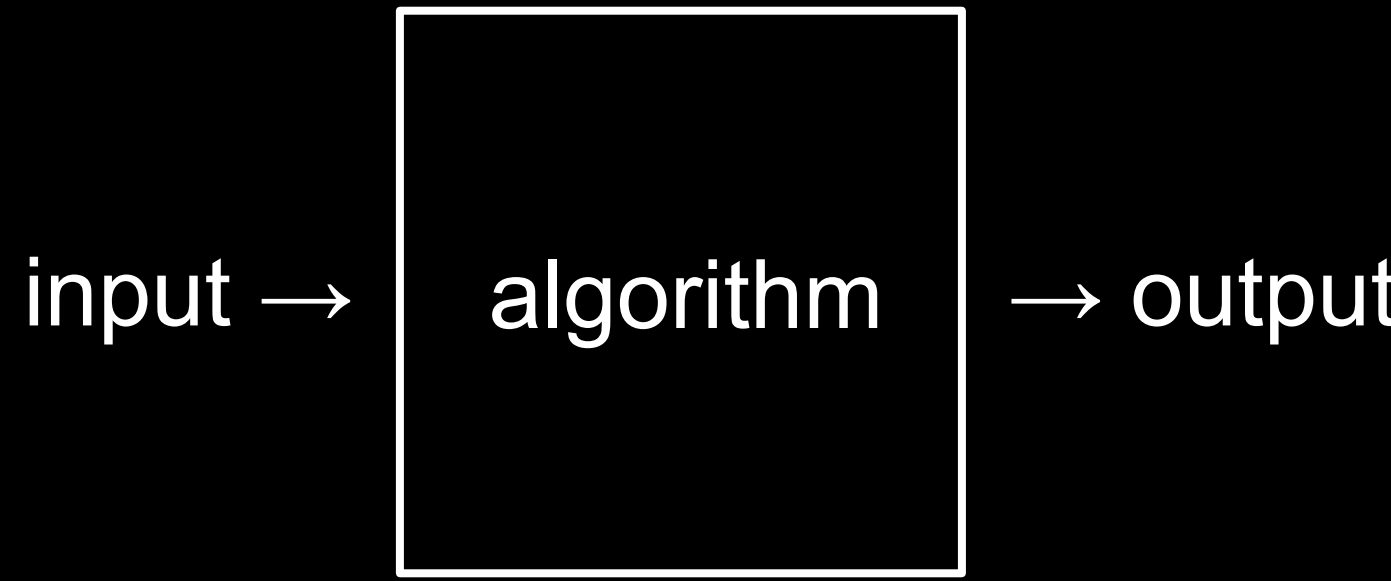

input →
algorithm
→ output

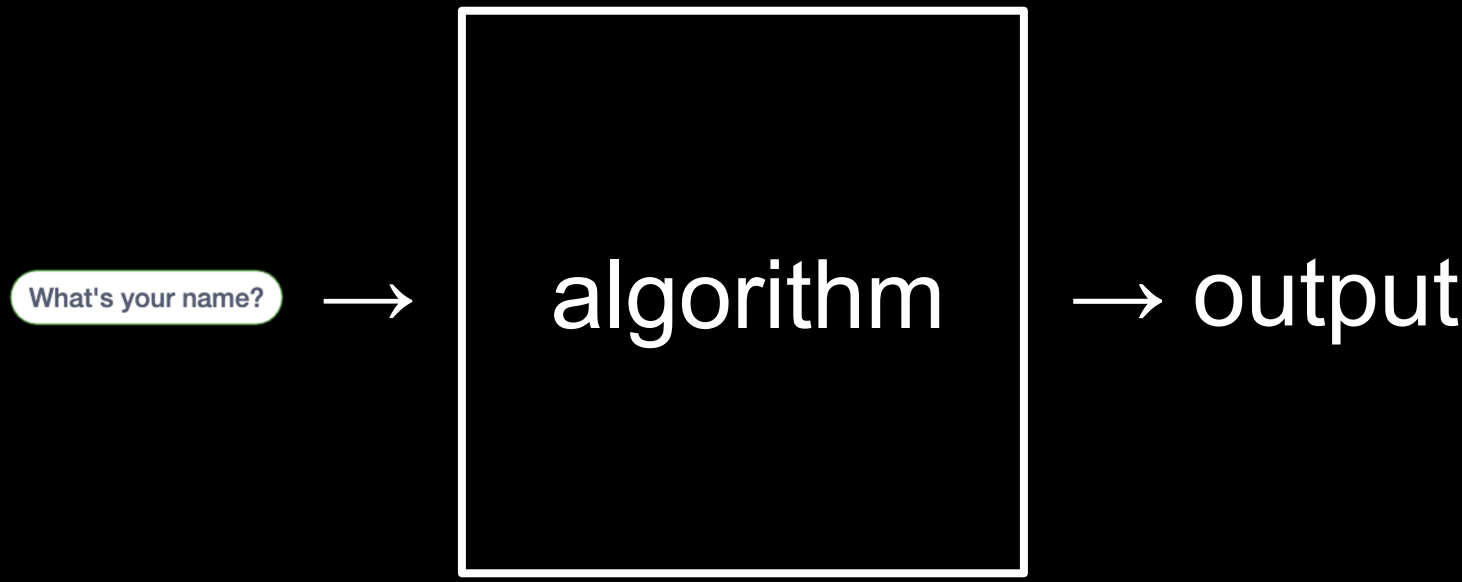

hello, world
algorithm
output

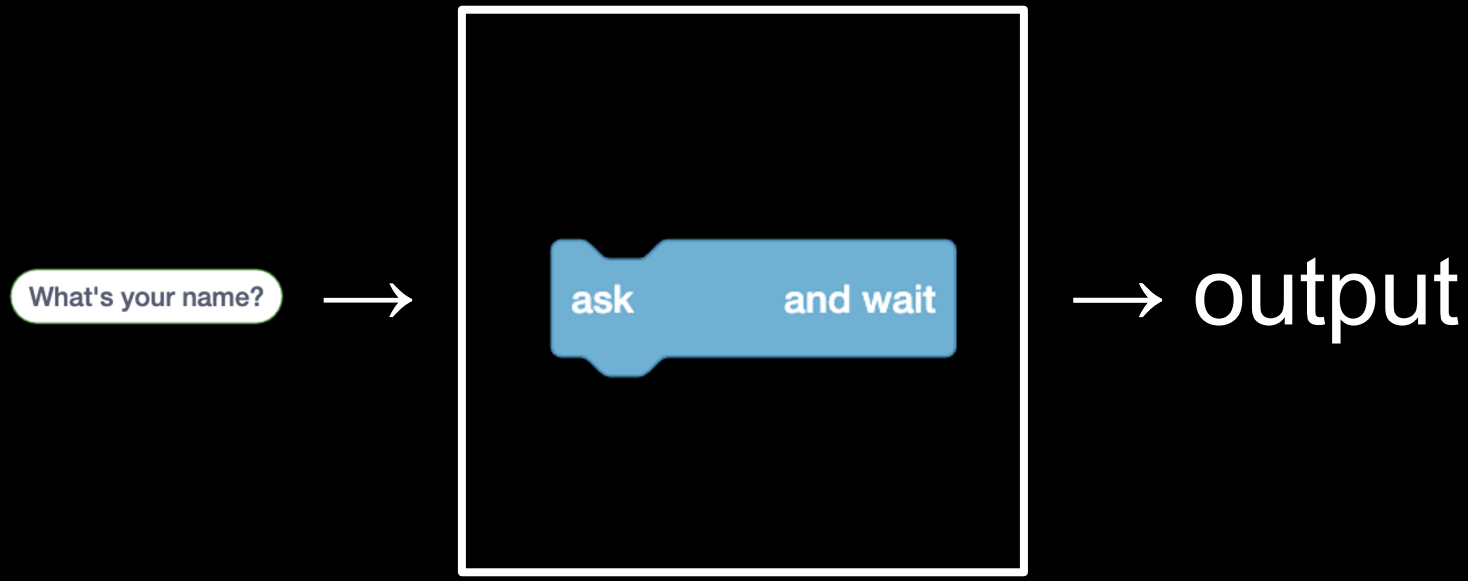

hello, world
say
output

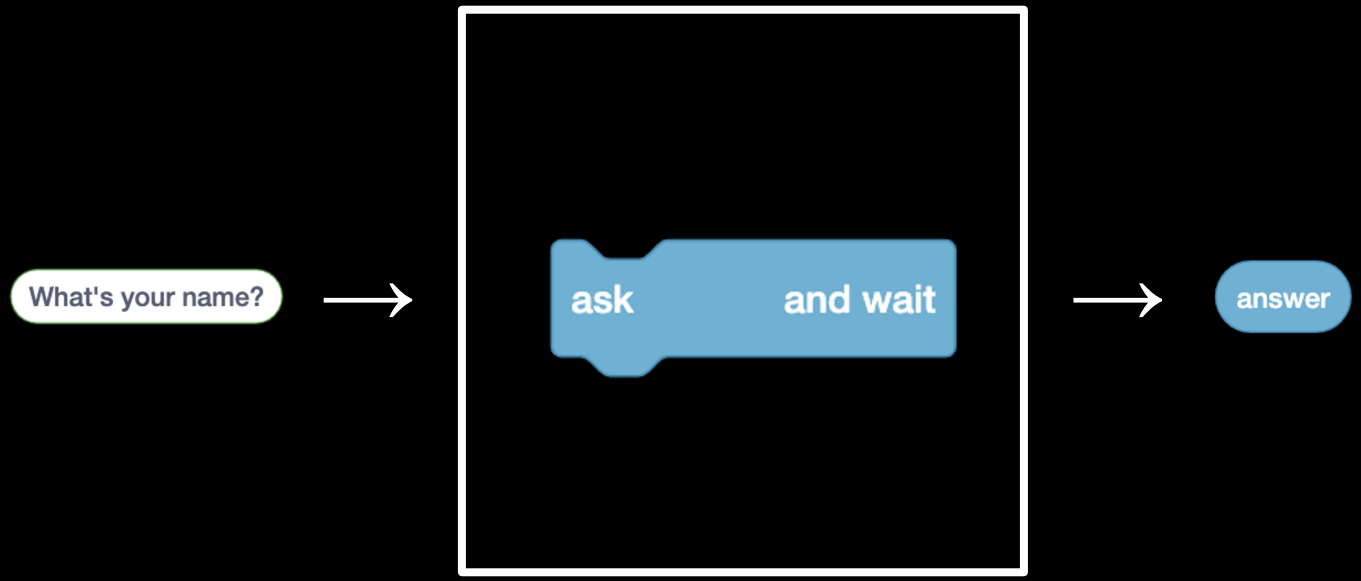

hello, world
say
hello, world


ask
What's your name?
and wait

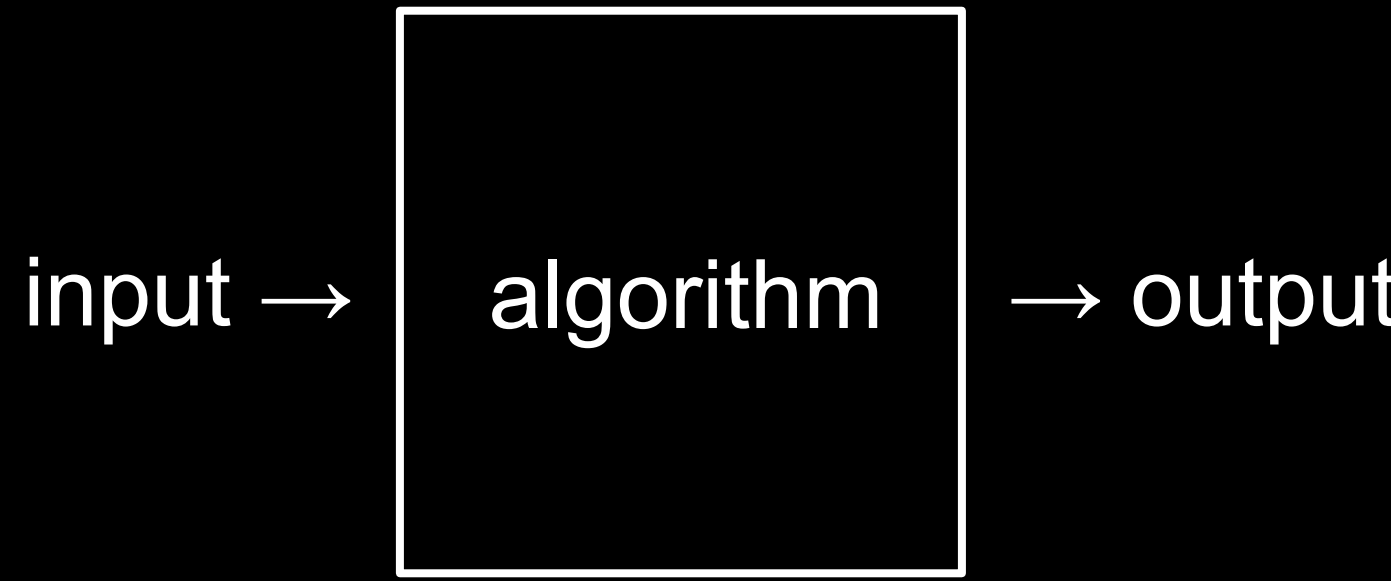

input →
algorithm
→ output

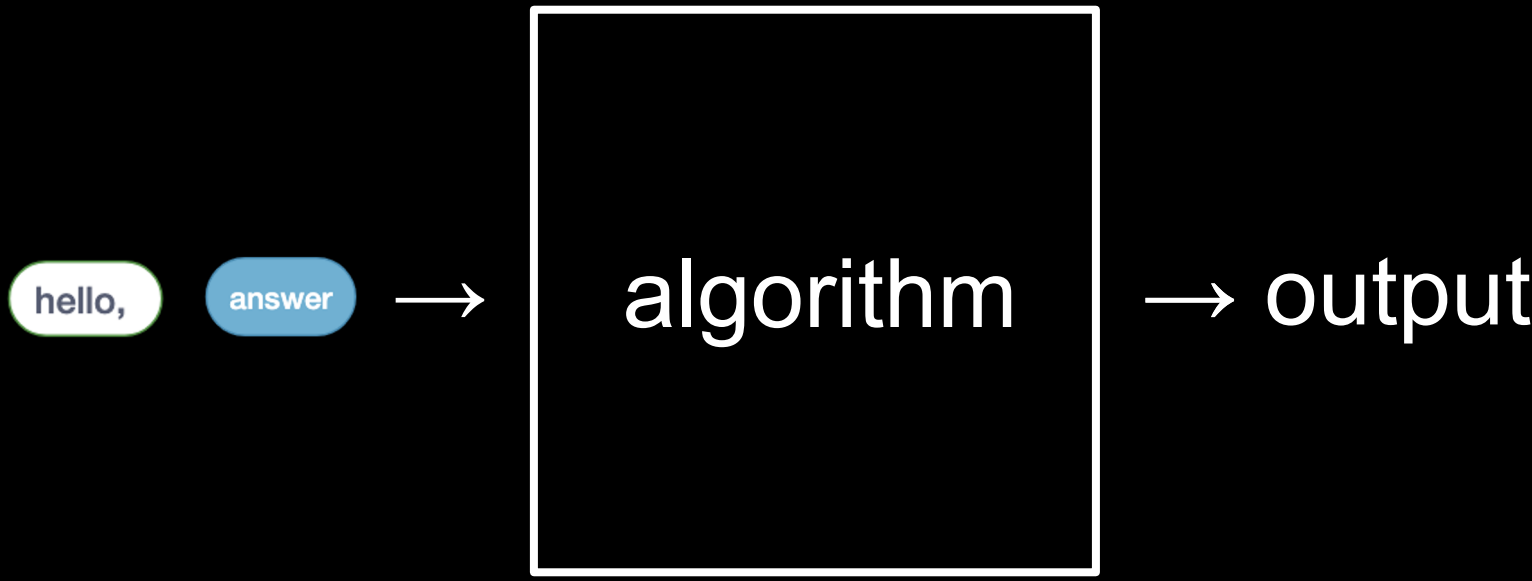

What's your name?
algorithm
output


What's your name?
ask
and wait
output


What's your name?
ask
and wait
answer


say
join
hello,
answer


input →
algorithm
→ output

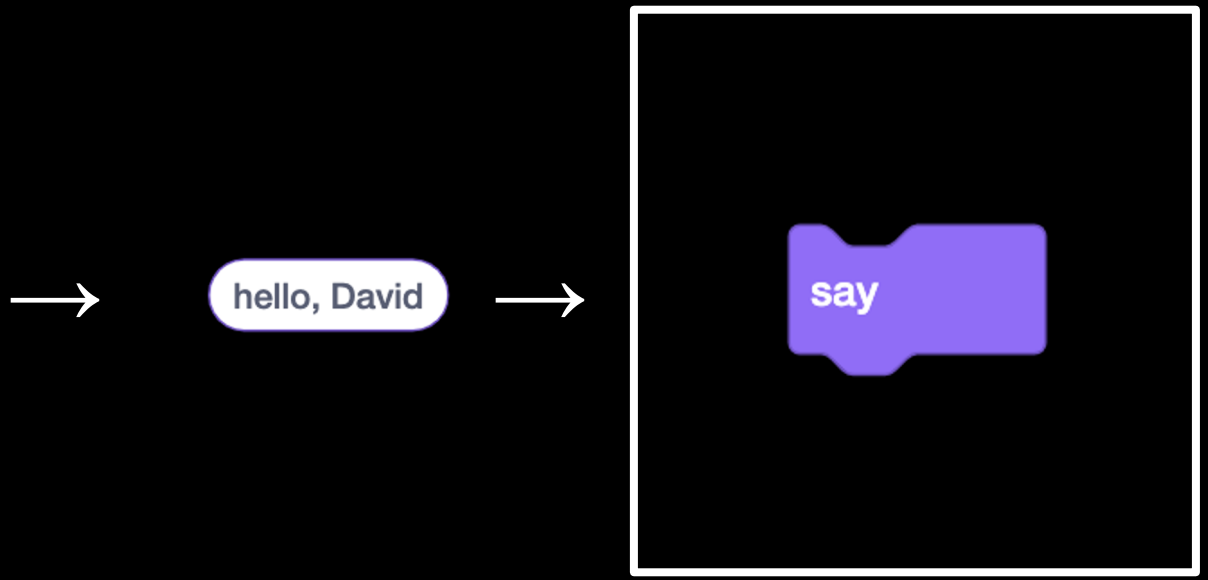

hello,
answer
algorithm
output

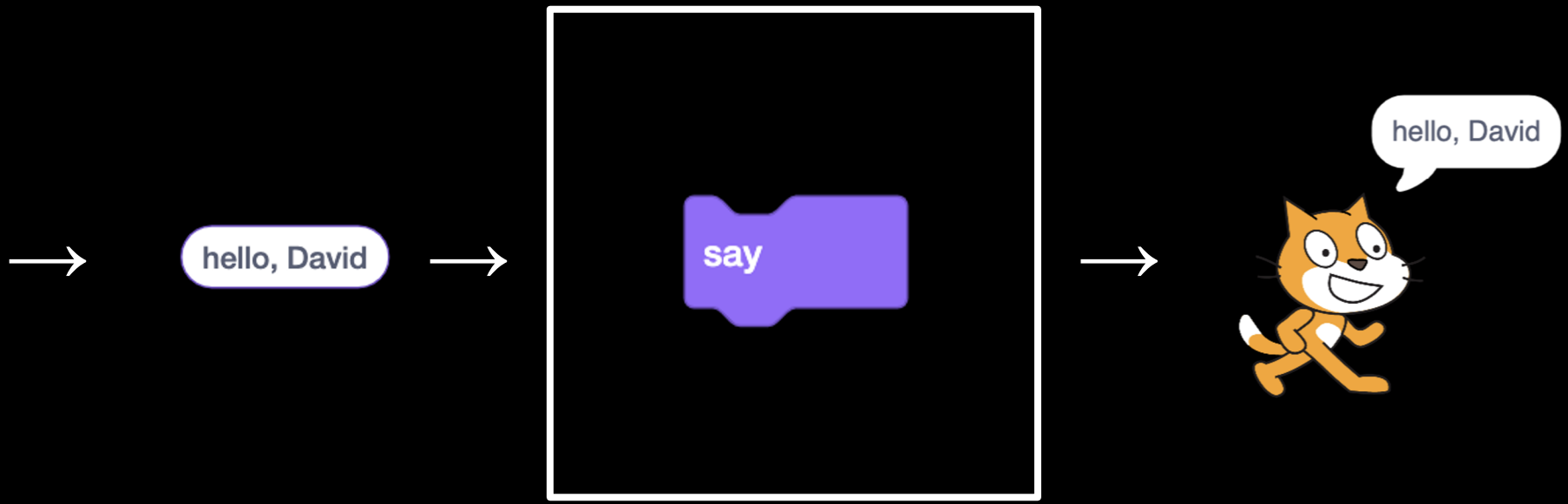

hello,
answer
join
output


hello,
answer
join
hello, David


hello, David


hello, David


hello, David
say

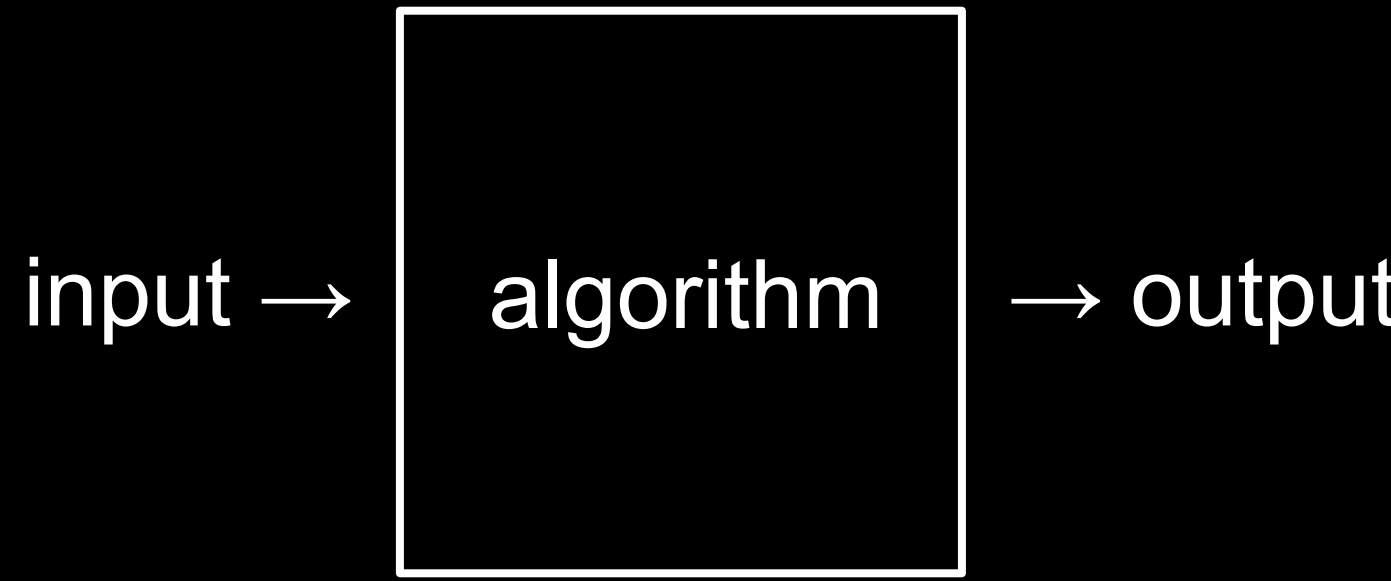

hello, David
say
hello, David

Oscartime

- Lamp post
- Trash can
- Falling trash
- Dragging trash
- Variables

Ivy’s Hardest Game

- Moving
- Bouncing
- Follow


input →
algorithm
→ output

Raiz quadrada

$$\sqrt[2]{x} = the\ y\ such\ that\ y\ \geq 0\ and\ y^2 = x$$

Raiz quadrada

Método de Newton

1. X é a entrada
2. aproximações sucessivas
3. média de y com x/y

Guess	Quotient	Average
1	(2/1) = 2	((2 + 1)/2) = 1.5
1.5	(2/1.5) = 1.3333	((1.3333 + 1.5)/2) = 1.4167
1.4167	(2/1.4167) = 1.4118	((1.4167 + 1.4118)/2) = 1.4142
1.4142	. . .	. . .