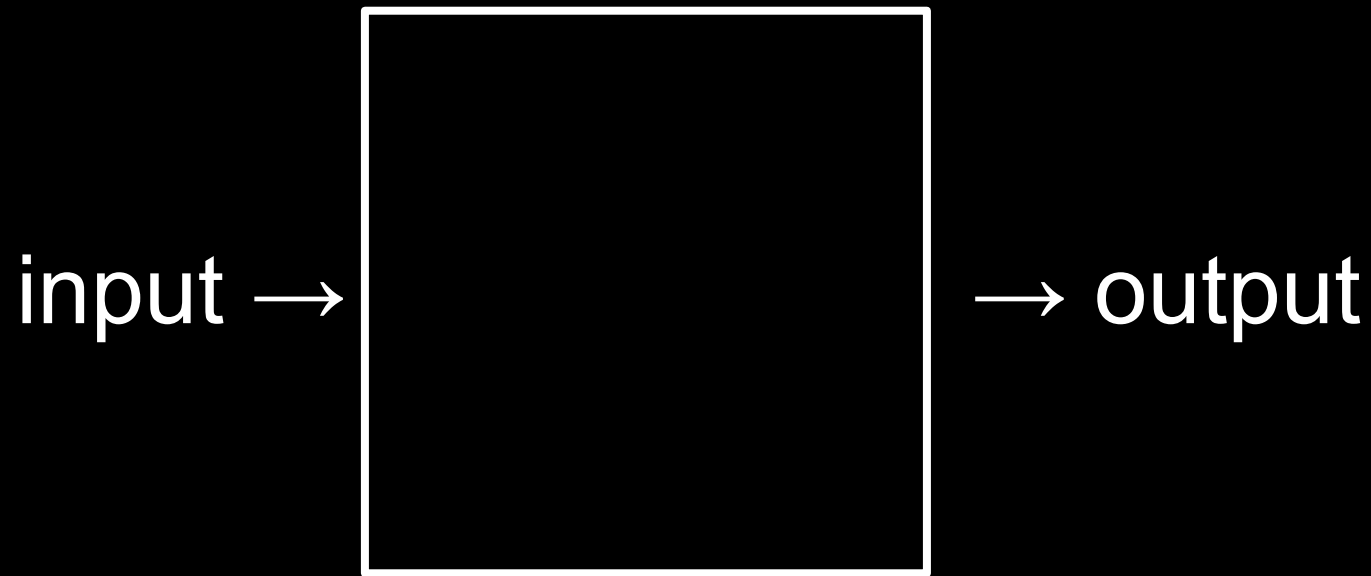


This is CS50

# 2/3

of CS50 students have never taken CS before

what ultimately matters in this course is not so much where  
you end up relative to your classmates but where  
you end up relative to yourself when you began



representation



0 1 2 3 4 5 6 7 8 9

0 1



123

1

123

10 1

123

100 10 1

123

100 10 1

123

$100 \times 1$

100 10 1

123

$100 \times 1$  +

100   10   1

123

$100 \times 1$     $+$     $10 \times 2$

100   10   1

123

$100 \times 1$     $+$     $10 \times 2$     $+$



100   10   1

123

$100 \times 1 + 10 \times 2 + 1 \times 3$

100 10 1

123

100 + 20 + 3

123

100 10 1

000

100 10 1

001

100 10 1

002

100 10 1

003

100 10 1

004



100 10 1

005

100 10 1

006

100 10 1

007

100 10 1

008

100 10 1

009

100 10 1

010

100 10 1

000

$10^2$   $10^1$   $10^0$

000



$2^2$     $2^1$     $2^0$

000

4 2 1

000

4 2 1

001

4 2 1

010

4 2 1

011

4 2 1

100

4 2 1

101

4 2 1

110



4 2 1

111

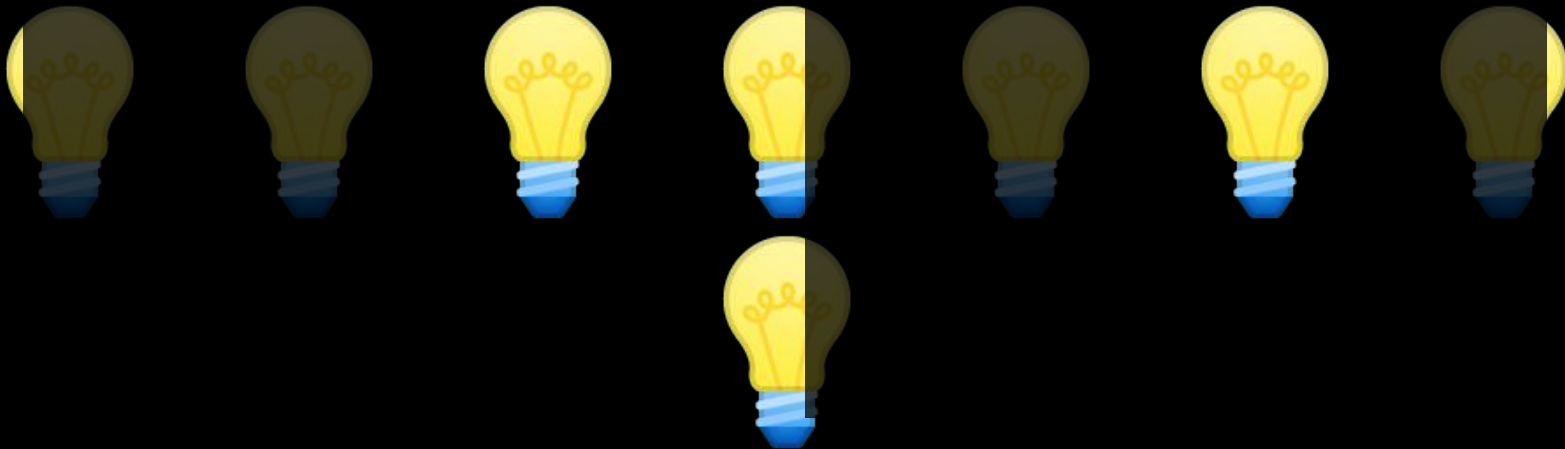
bit



bit bit bit bit bit bit bit bit



byte



A



65

01000001

65

ASCII

... A B C D E F G H I ...

... 65 66 67 68 69 70 71 72 73 ...

72

73

33

H

72

I

73

33

H

72

I

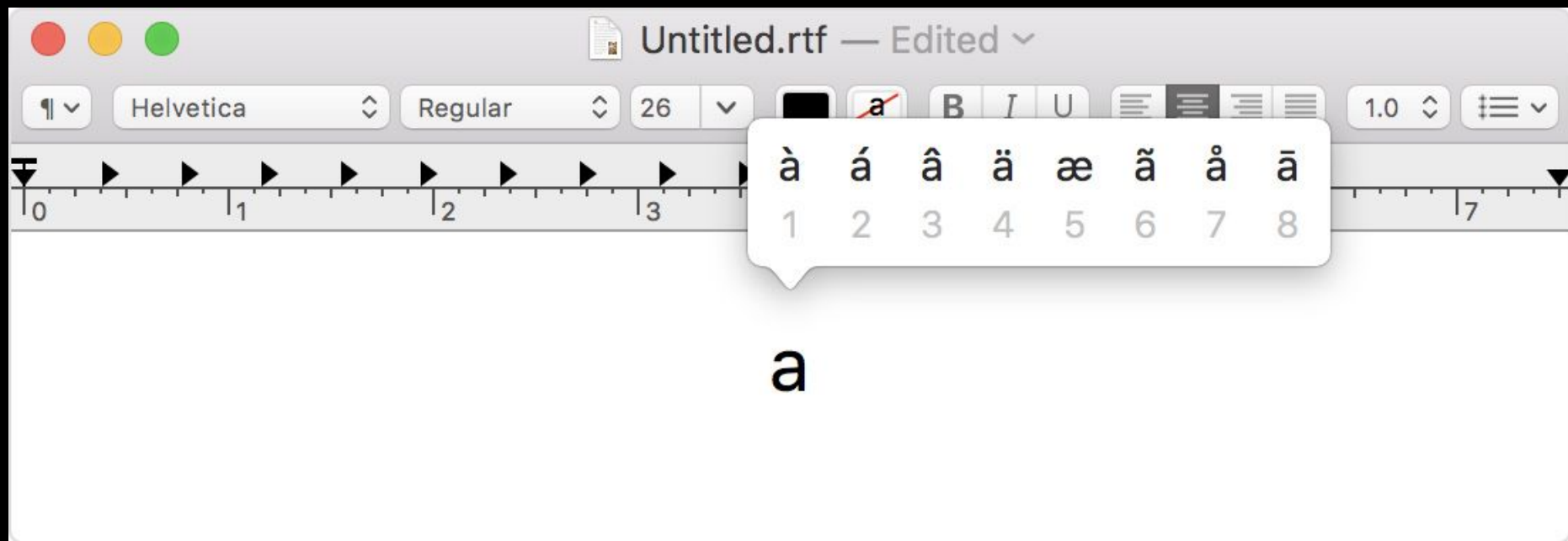
73

!

33



~ `	1 !	2 @	3 #	4 \$	5 %	6 ^	7 &	8 *	( (	) )	- _	+ =	← Backspace
Tab ⇐ ⇒	Q	W	E	R	T	Y	U	I	O	P	{ [	} ]	 \ _
Caps Lock ⬆	A	S	D	F	G	H	J	K	L	: ;	" '	Enter ↵	
Shift ⬆	Z	X	C	V	B	N	M	< ,	> .	? /	Shift ⬆		
Ctrl	Win Key	Alt								Alt	Win Key	Menu	Ctrl





Search

## FAVORITES



## SMILEYS & PEOPLE



Unicode



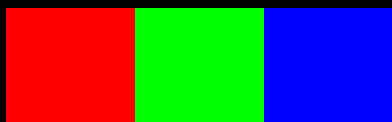
128514

11111011000000010





RGB

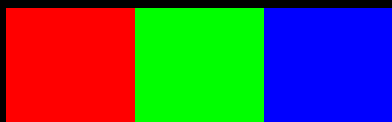


72 73 33

72

73

33

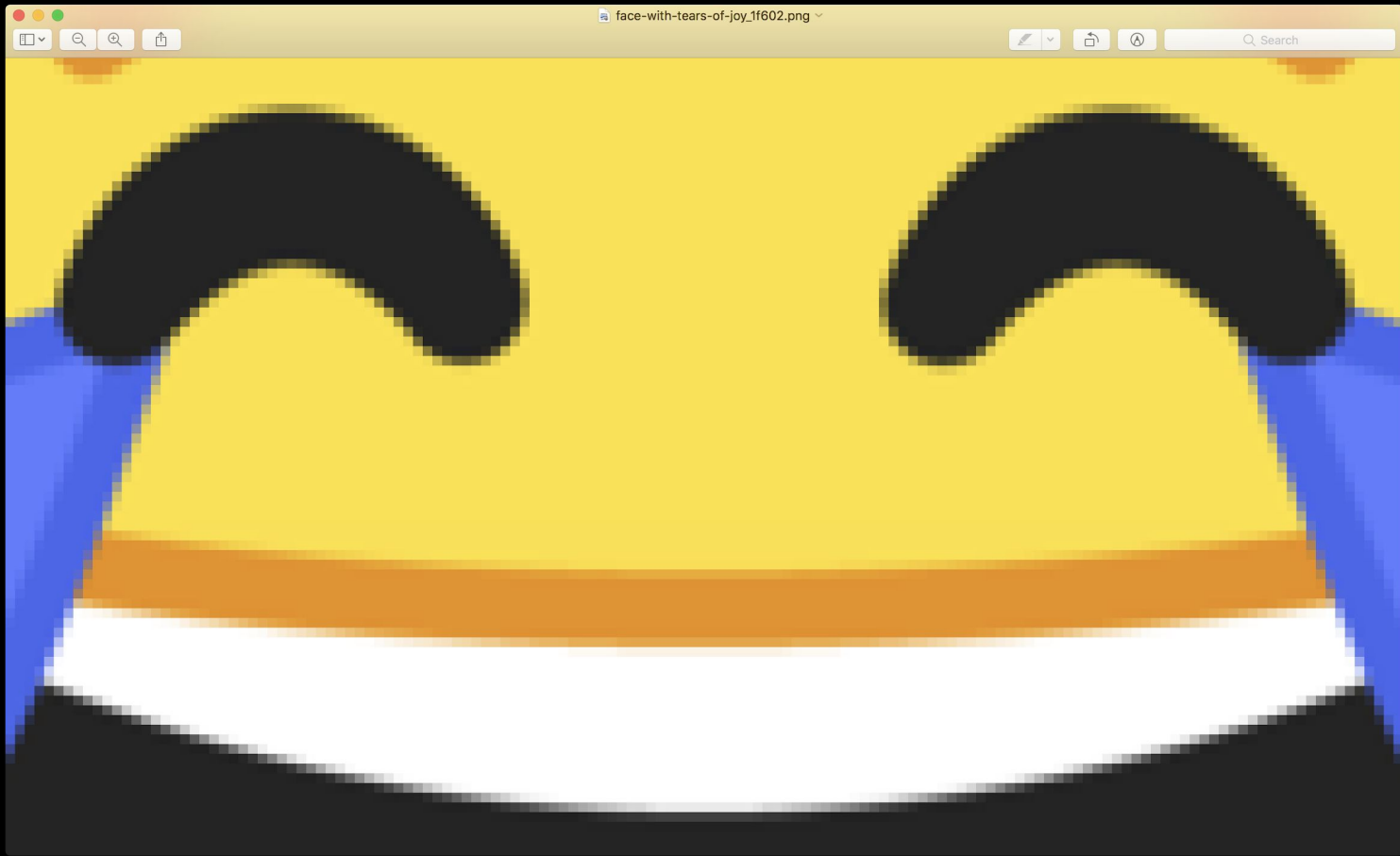


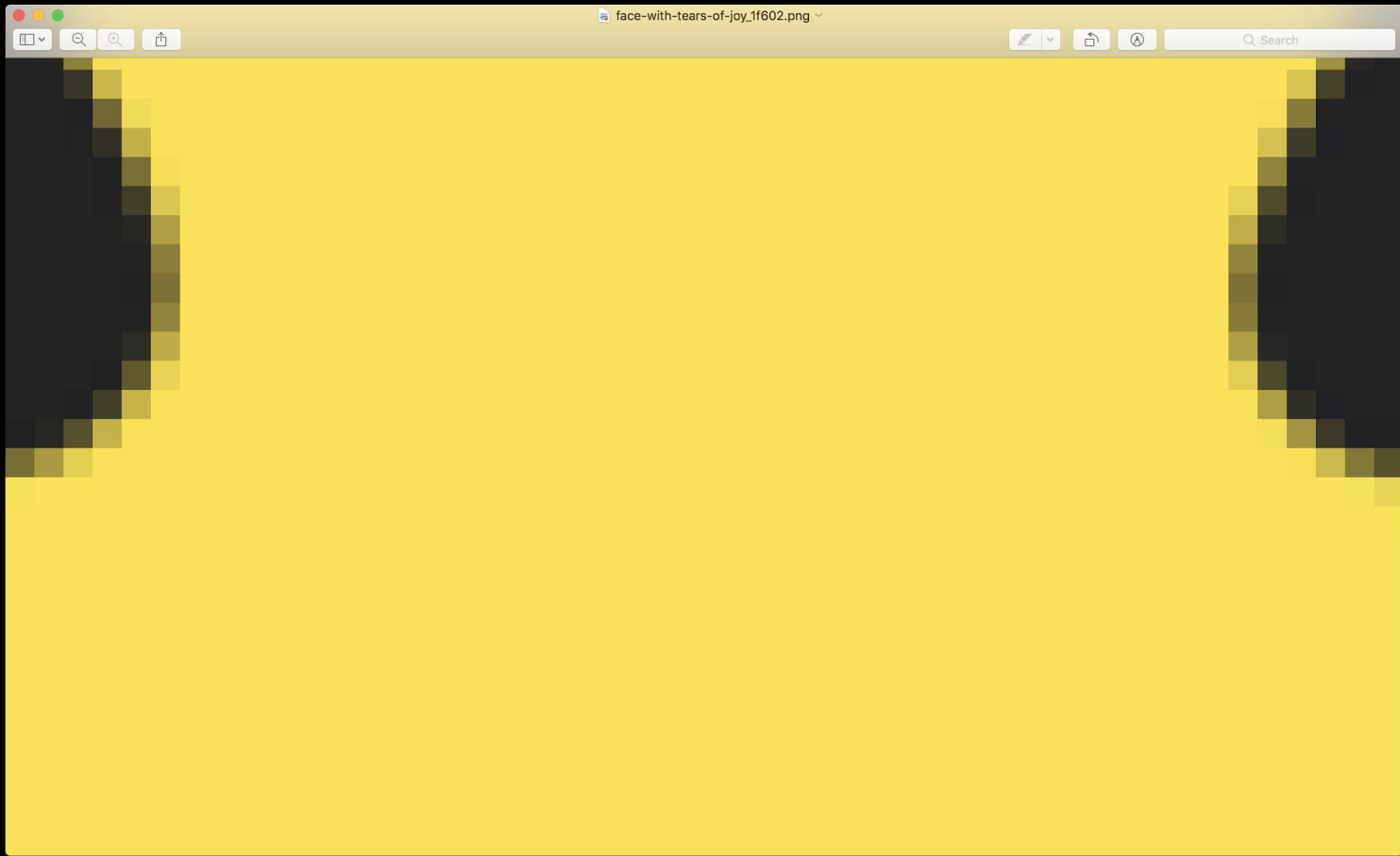




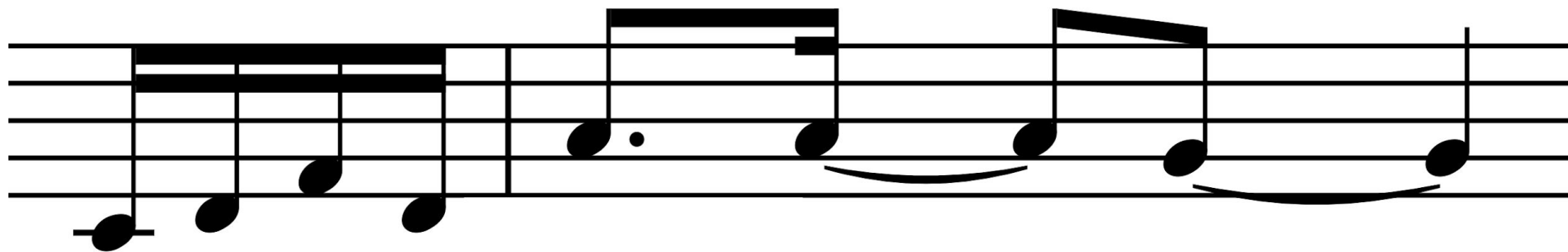
















algorithms

1024

512

256

128

64

32

16

8

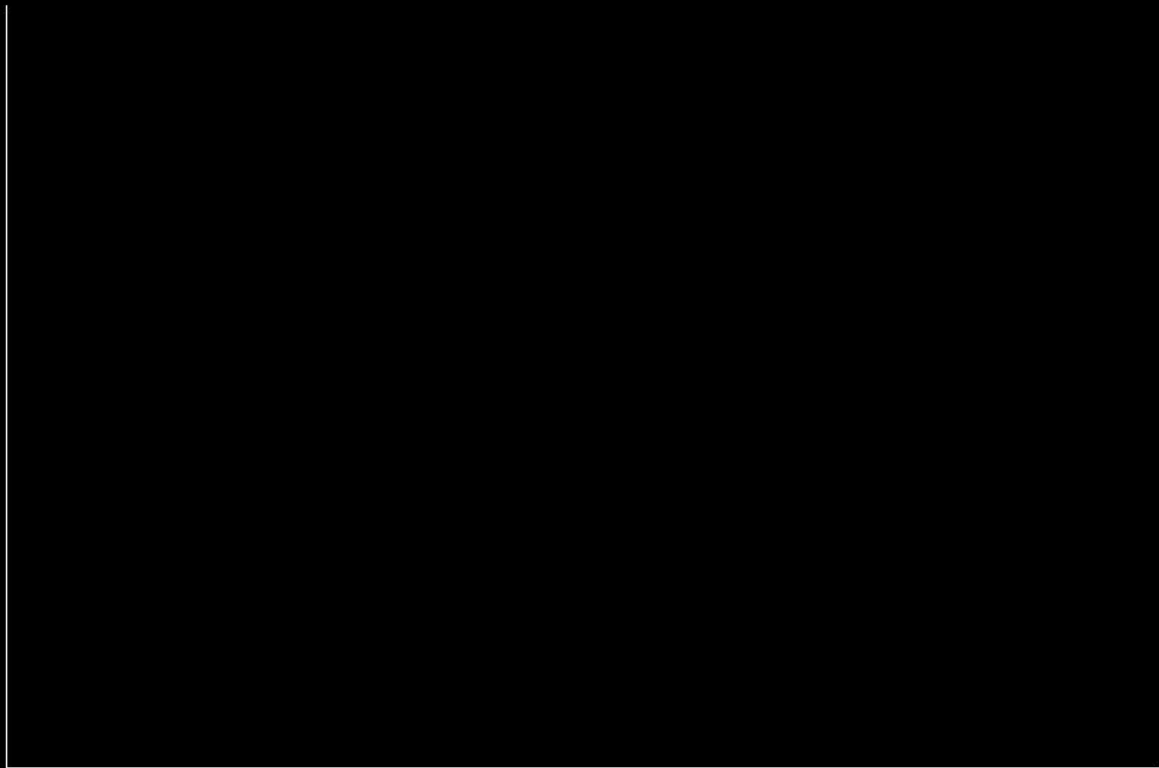
4

2

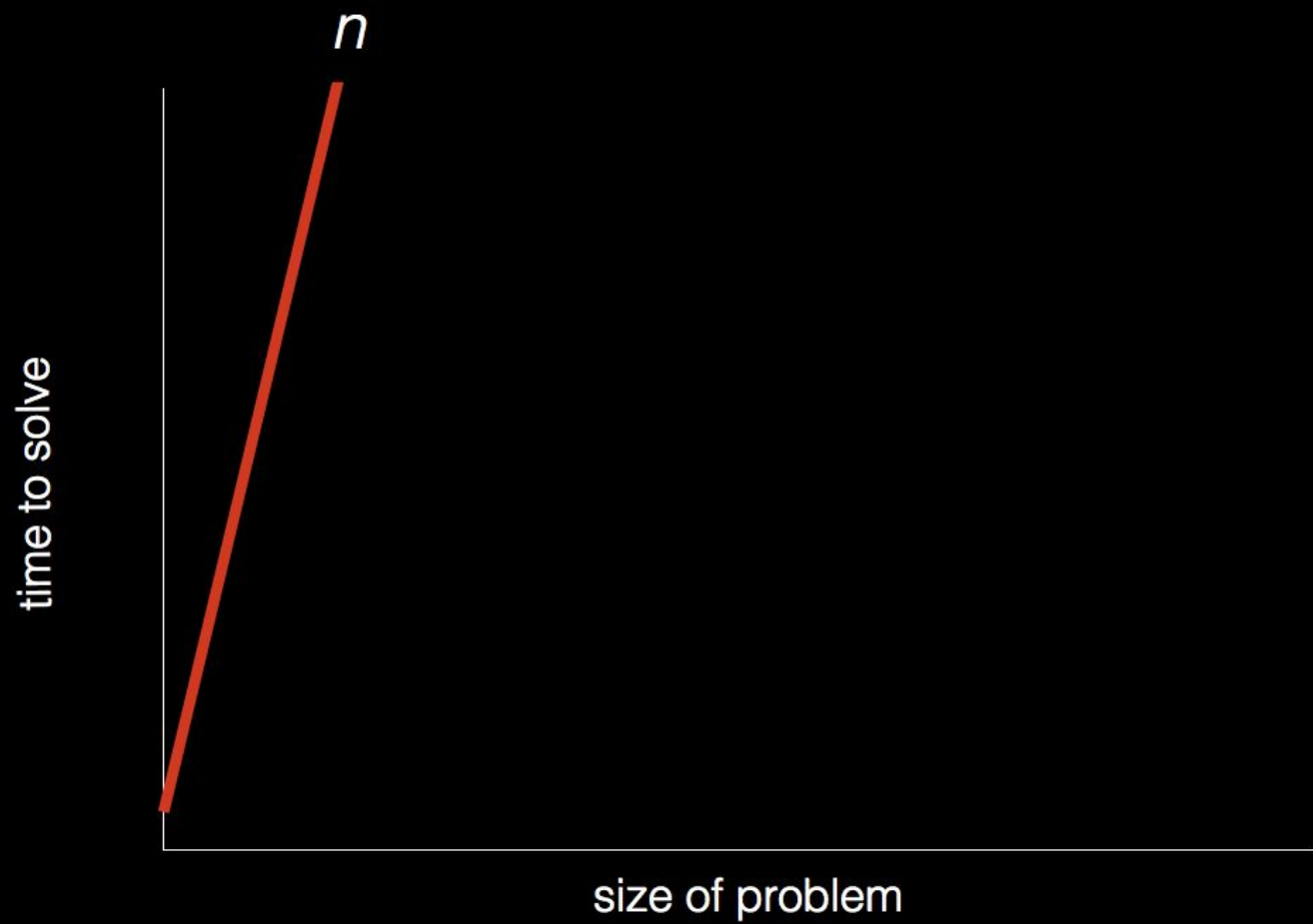
1

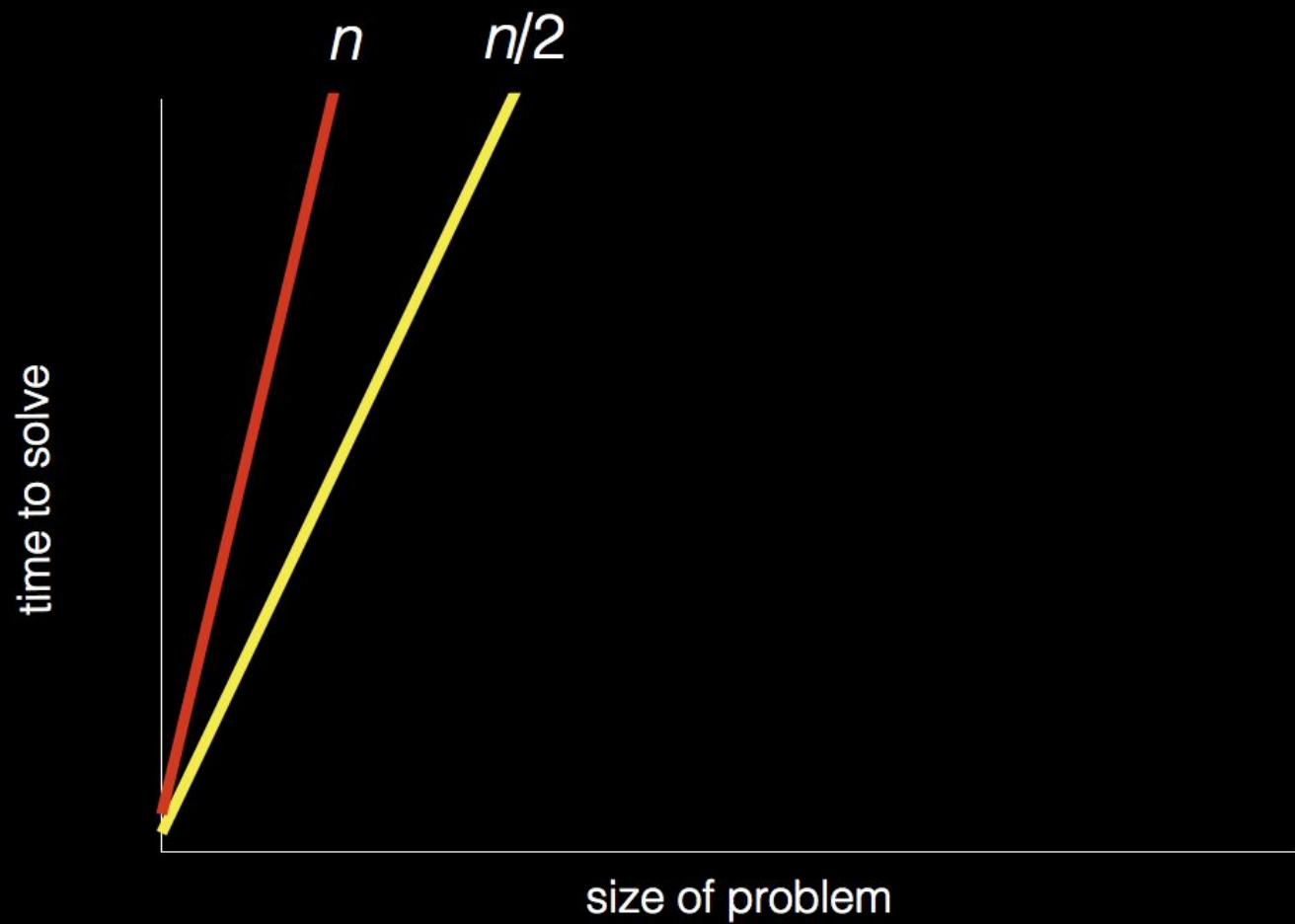
time to solve

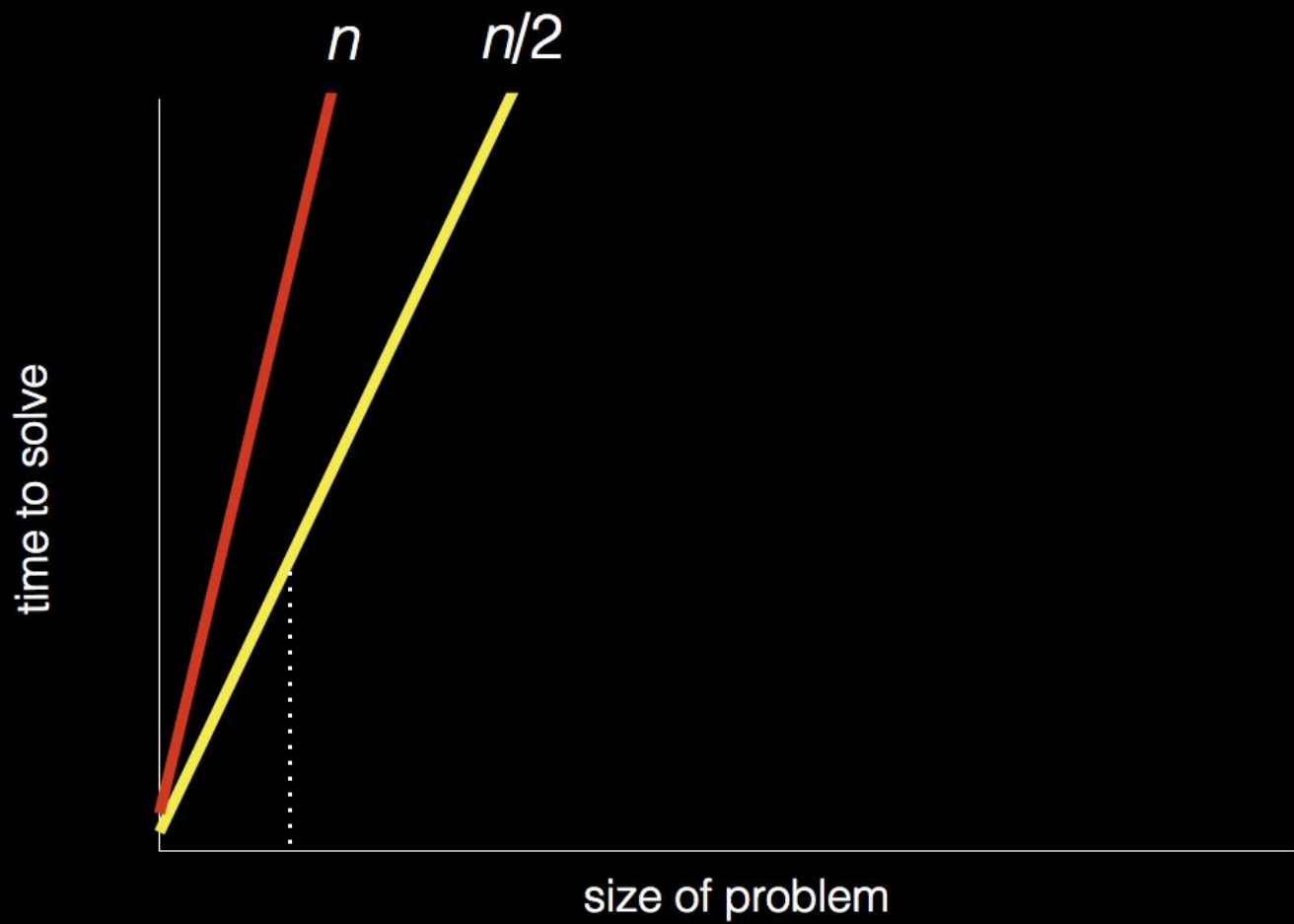
size of problem

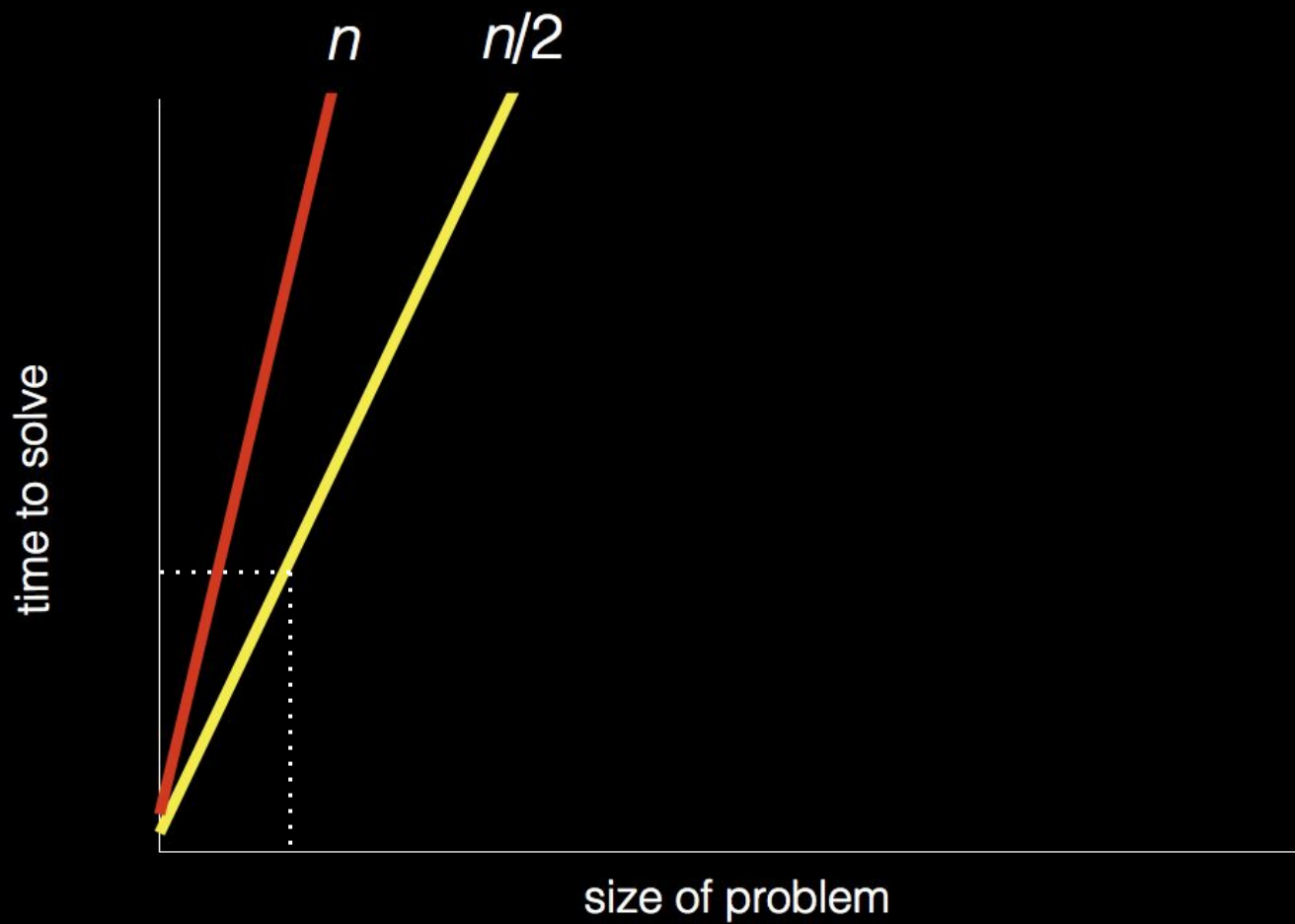




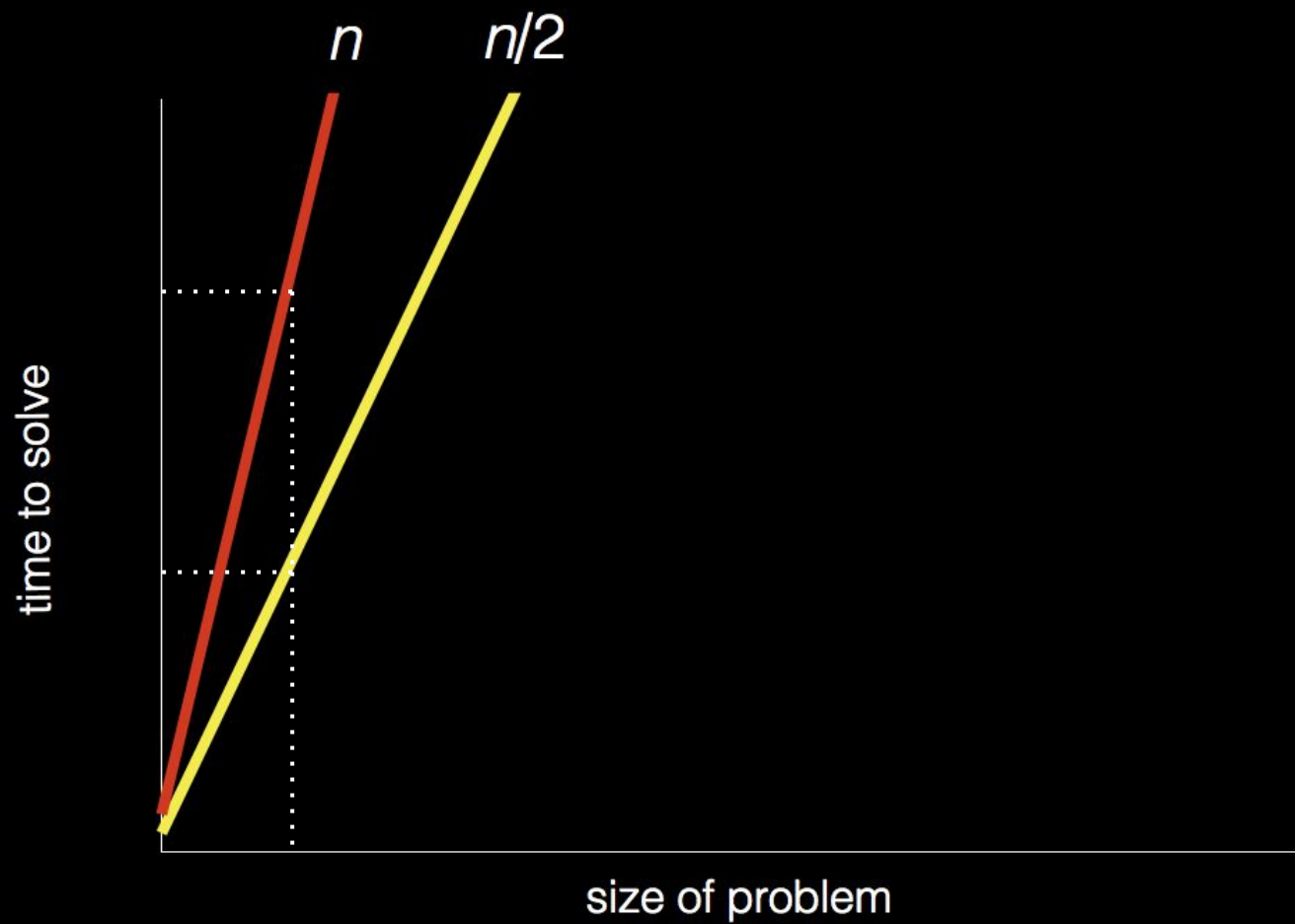


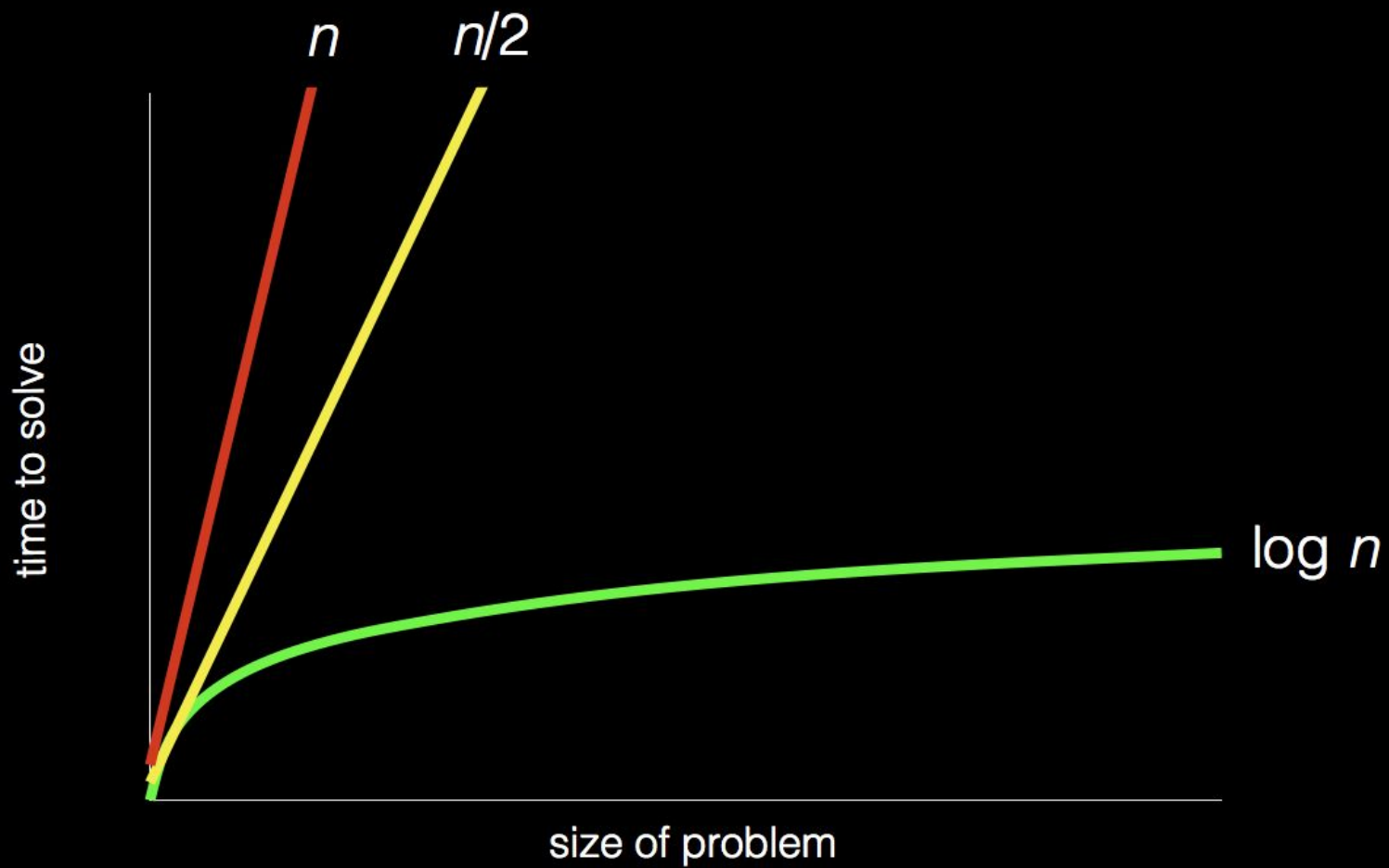












pseudocode



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

```
1  Pick up phone book
2  Open to middle of phone book
3  Look at page
4  If Smith is on page
5      Call Mike
6  Else if Smith is earlier in book
7      Open to middle of left half of book
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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
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```

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8      Go back to line 3
9  Else if Smith is later in book
10     Open to middle of right half of book
11     Go back to line 3
12 Else
13     Quit
```

- functions
- conditions
- Boolean expressions
- loops

- functions
- conditions
- Boolean expressions
- loops
- variables
- threads
- events
- ...

```
#include <stdio.h>
```

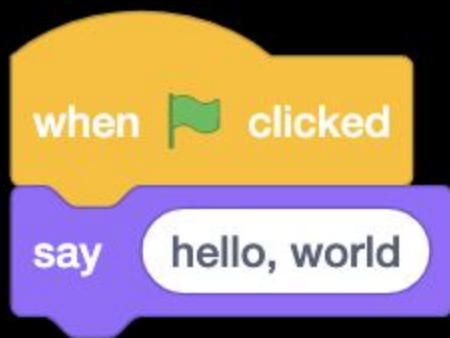
```
int main(void)
```

```
{
```

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

```
}
```





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



Stage

Backdrops

1





Code

Costumes

Sounds



Motion



Looks



Sound



Events



Control



Sensing



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Variables



My Blocks

## Motion

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90



Sprite1

Stage

Backdrops

1



Code

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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

Scratch Cat

Stage

Sprite1

Size 100 Direction 90

Sprite1

Backdrops 1

Code

Costumes

Sounds

Motion

Looks

Sound

Events

Control

Sensing

Operators

Variables

My Blocks

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

Scratch

Zoom In

Zoom Out

Reset Stage

Stage

Sprite1

Size 100

Direction 90

Sprite1

Backdrops 1

Scratch

Zoom In

Zoom Out

Reset Stage

Code

Costumes

Sounds

Motion

Looks

Sound

Events

Control

Sensing

Operators

Variables

My Blocks

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

Scratch Cat

Search

Reset

Help

Stage

Backdrops

Sprite1

Size 100

Direction 90

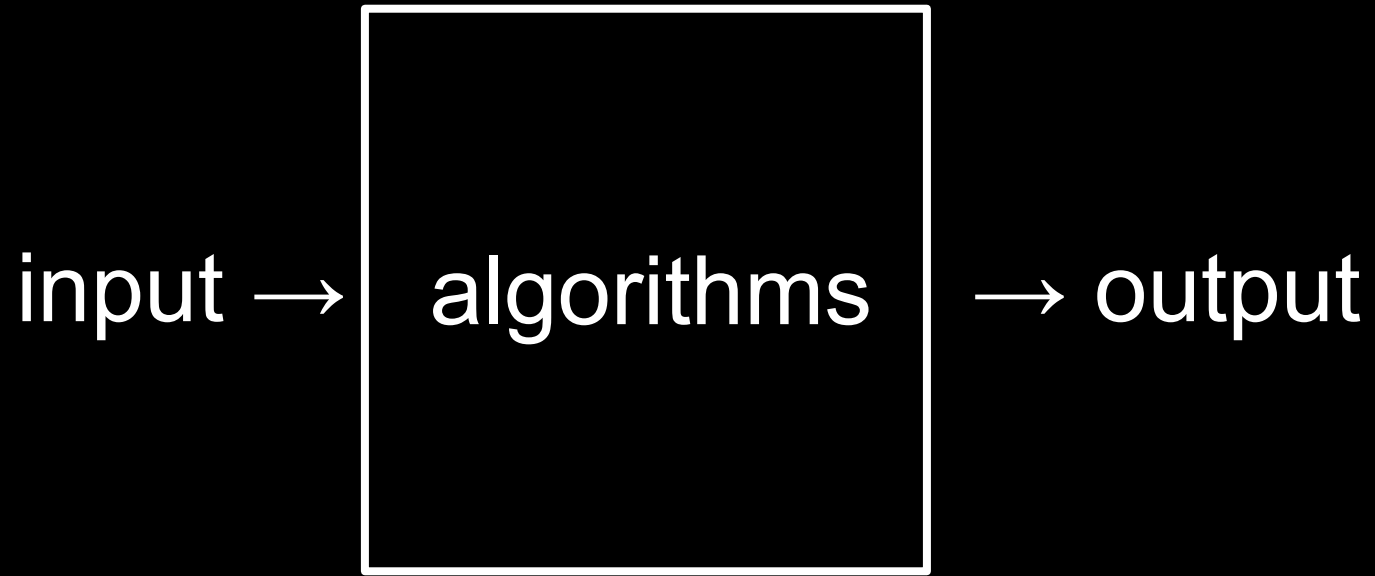
Sprite1

Stage

Backdrops

say

hello, world





hello, world

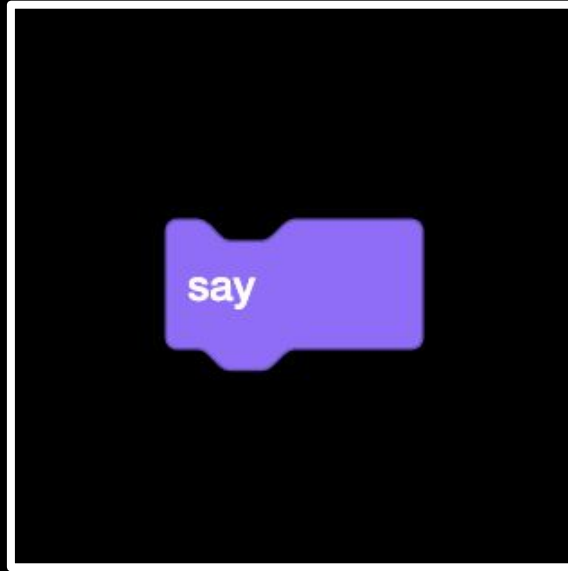


algorithms



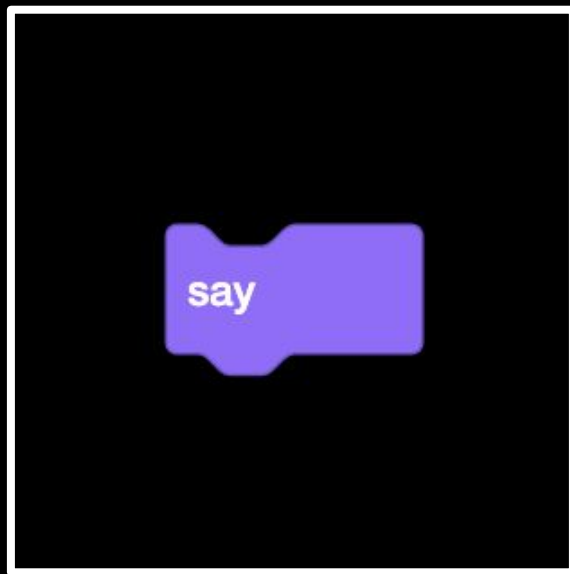
output

hello, world



→ output

hello, world

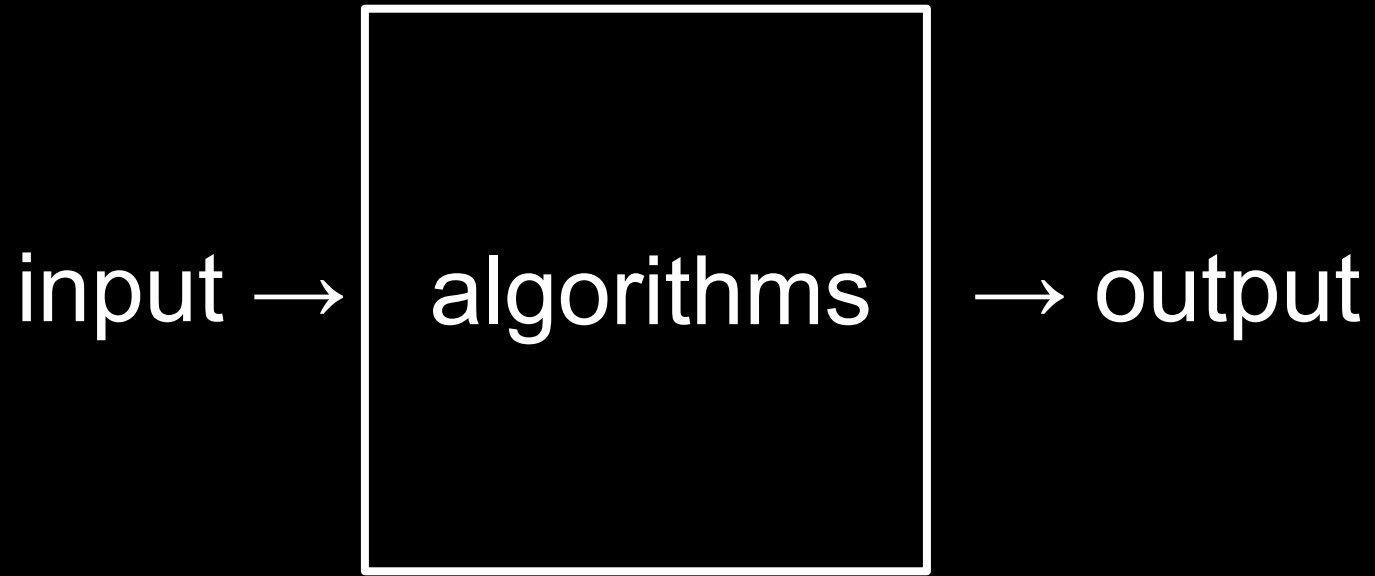


A blue Scratch 'ask and wait' block with a notch on the left and a bump on the right. It contains a white text input field with the text 'What's your name?'.

ask

What's your name?

and wait



What's your name?

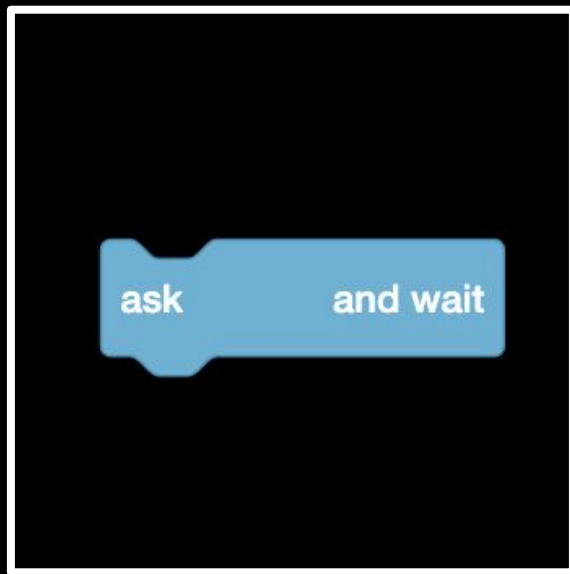


algorithms

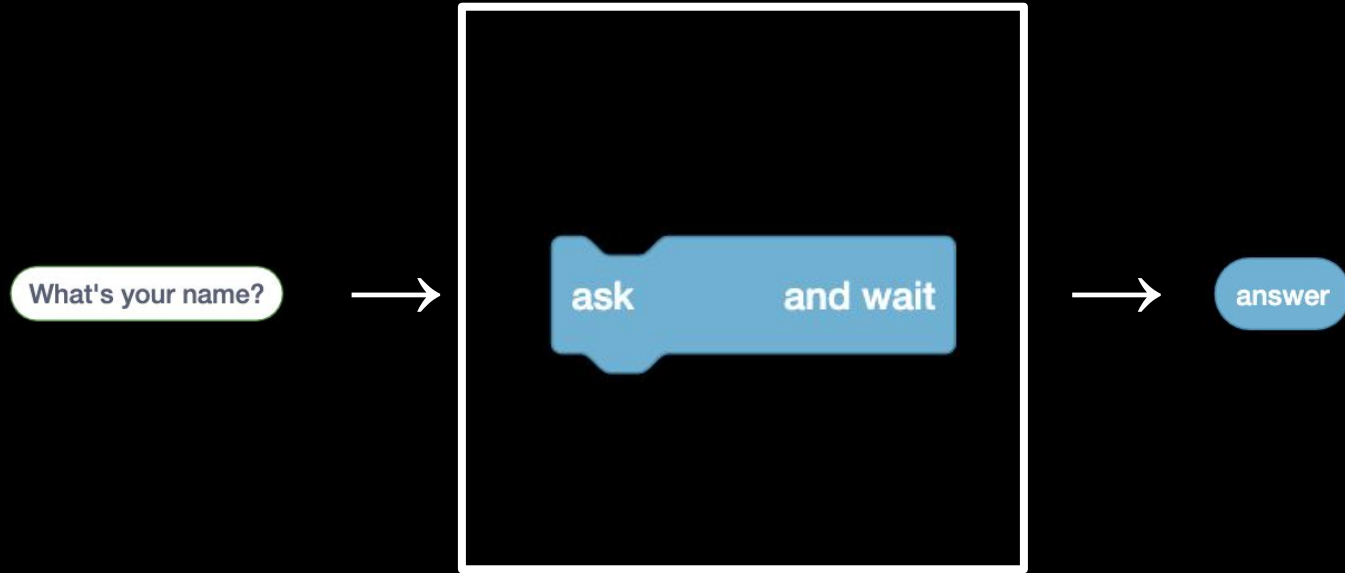


output

What's your name?



→ output





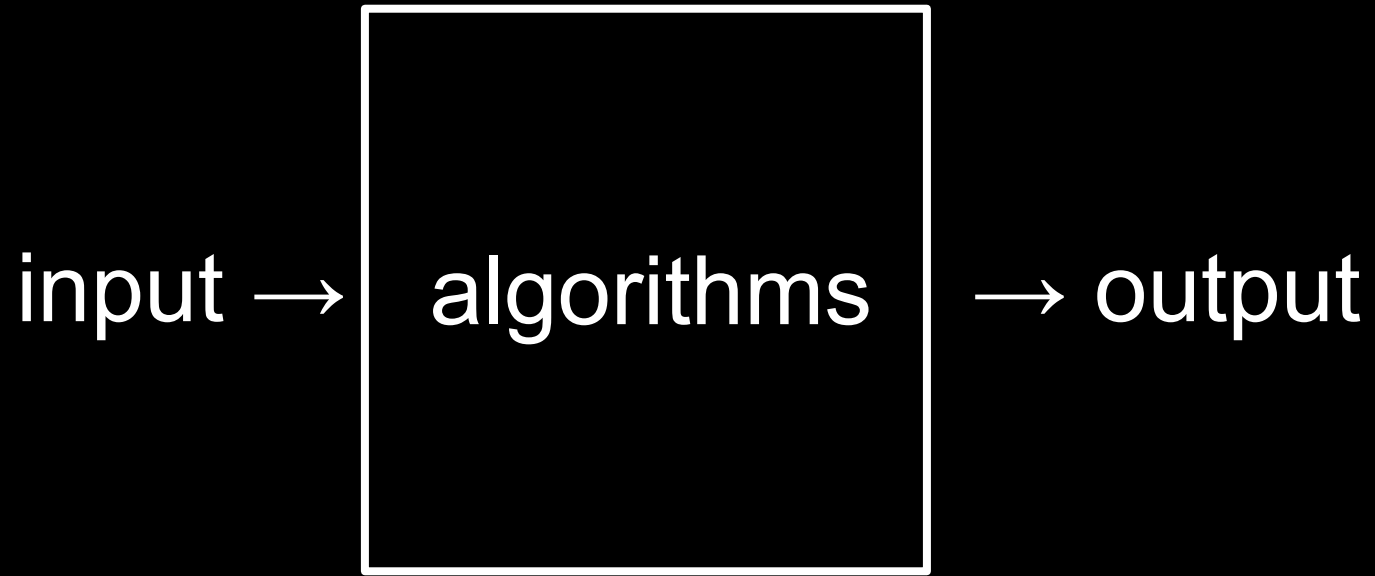


say

join

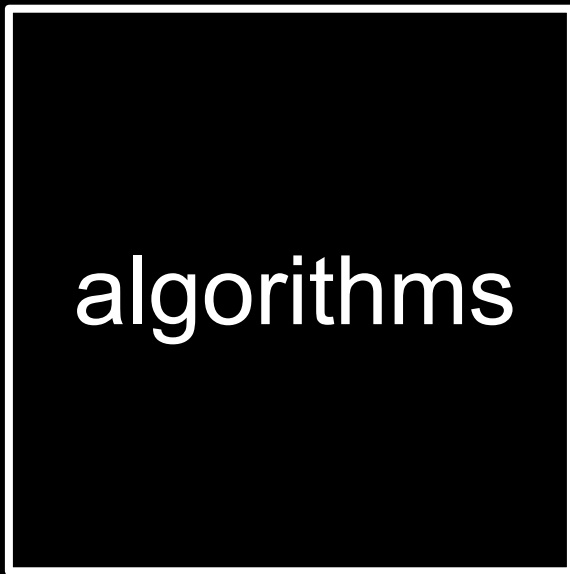
hello,

answer

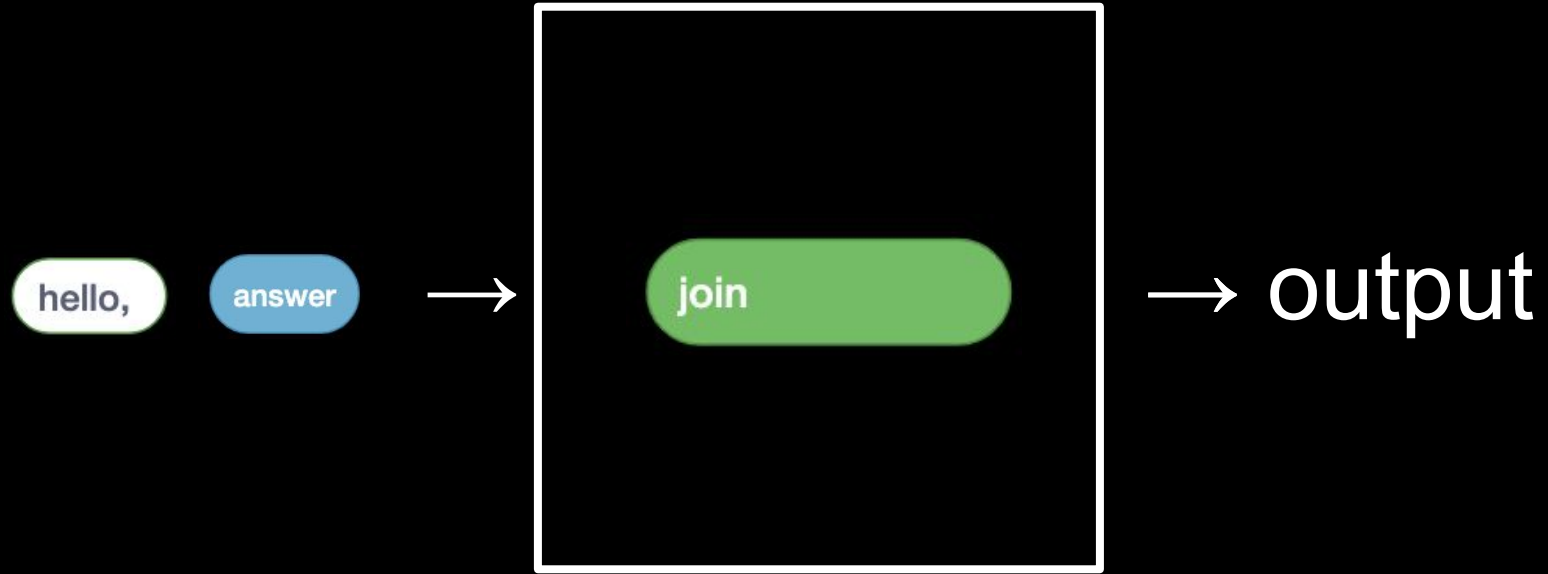


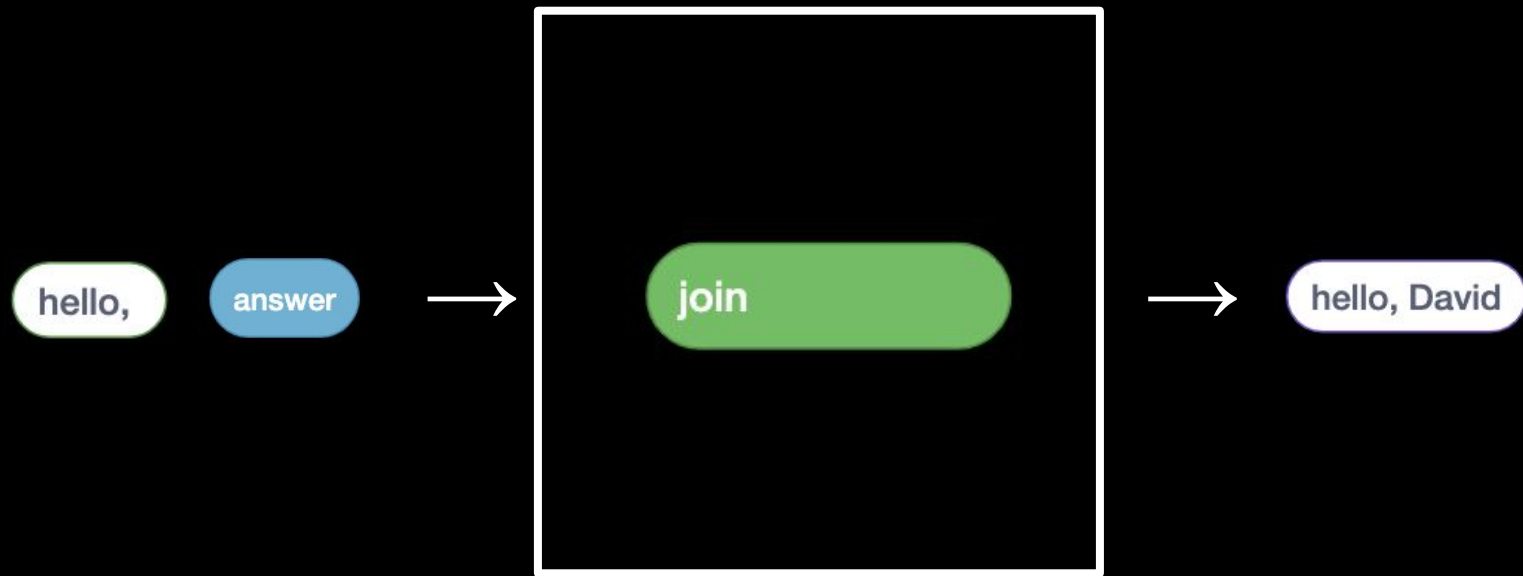
hello,

answer



output







hello, David



hello, David



hello, David







hello, David



say



hello, David







This is CS50