Today we will

- Answer any questions you have about the first assignment (10’)
- Finish Chapter 2 - “Save and New” (5’)
- Learn about functions (30’)

Fill out the check list

1. Fill out the Checklist on your ICA (individual)
2. Open the slides on your machine

3. Ask questions about Programming Assignment 1 on Live Piazza

CS 101
Intro to Processing - cont

Chapter 2

How to Save files

Show on Chapter 2

For the project, name the **files** exactly as asked in the specifications.

Turning In Your Answers (Files) to Gradescope

You can turn in things as many times as you want, but you must turn in all of the files at the same time; we will grade the most recent files you upload.
If you only upload a few files at a time, we will only see (and grade) the ones in the last upload.

Once you've uploaded your files to GradeScope, you're done. Good job!

`ellipse(50, 50, 80, 80);`

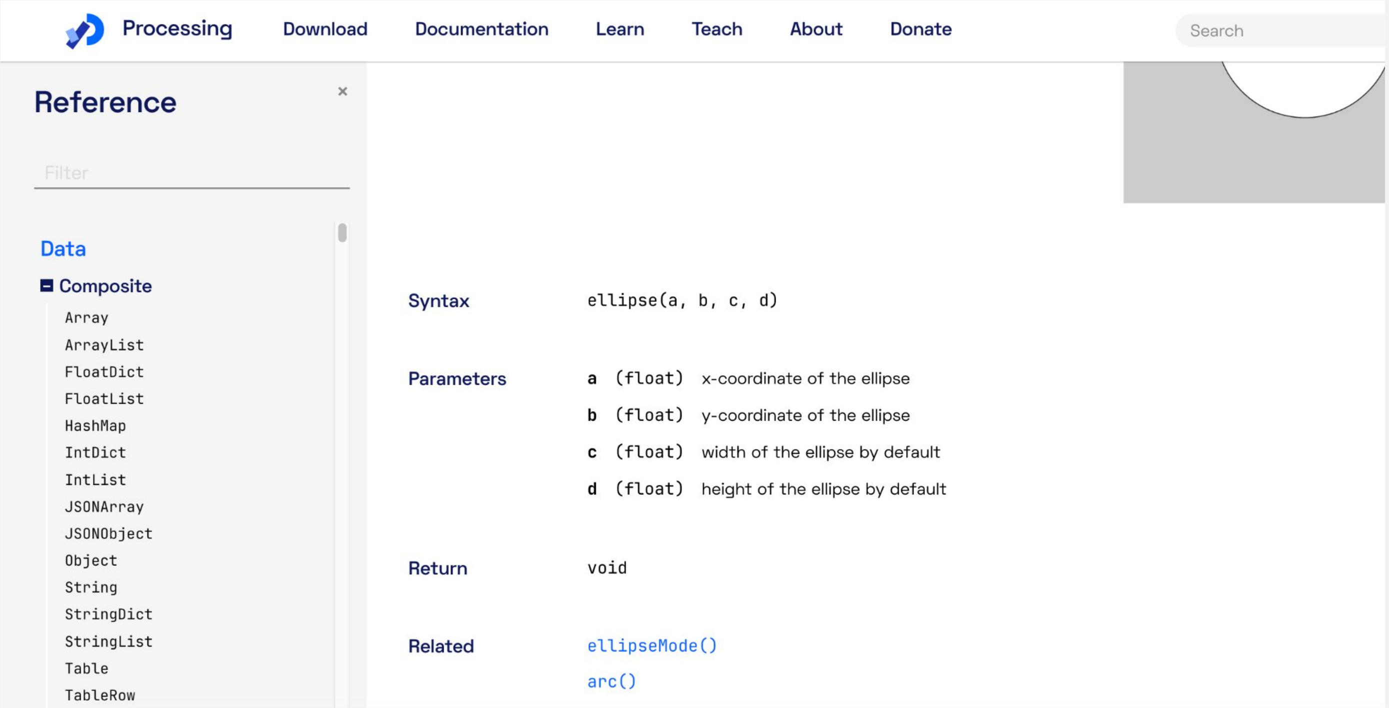
- We need to know how big the canvas is!
- The default size of the canvas is 100 X 100
- The code below

  ```
  ellipse(50, 50, 80, 80);
  ```

  - draws an ellipse with the center at (50,50)
  - the width is 80
  - the height is 80
  - (a circle…)

Always read the reference!

In Processing go to **Help** -> **Reference**



Syntax	`ellipse(a, b, c, d)`
Parameters	**a** `(float)` x-coordinate of the ellipse **b** `(float)` y-coordinate of the ellipse **c** `(float)` width of the ellipse by default **d** `(float)` height of the ellipse by default
Return	`void`

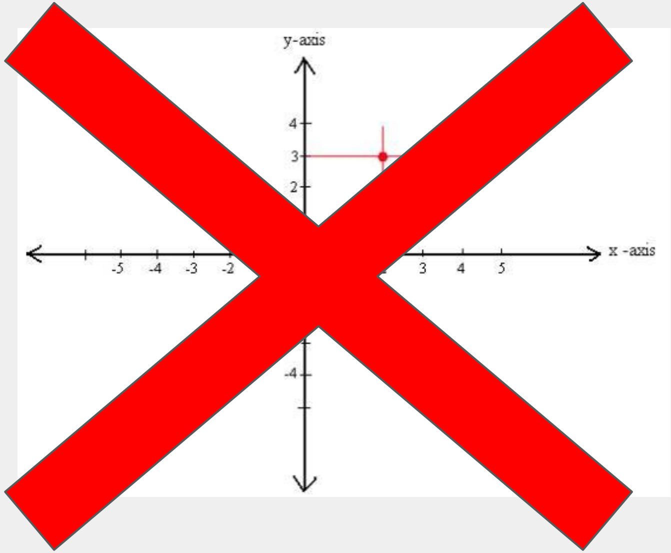
Related	`ellipseMode()`
	`arc()`

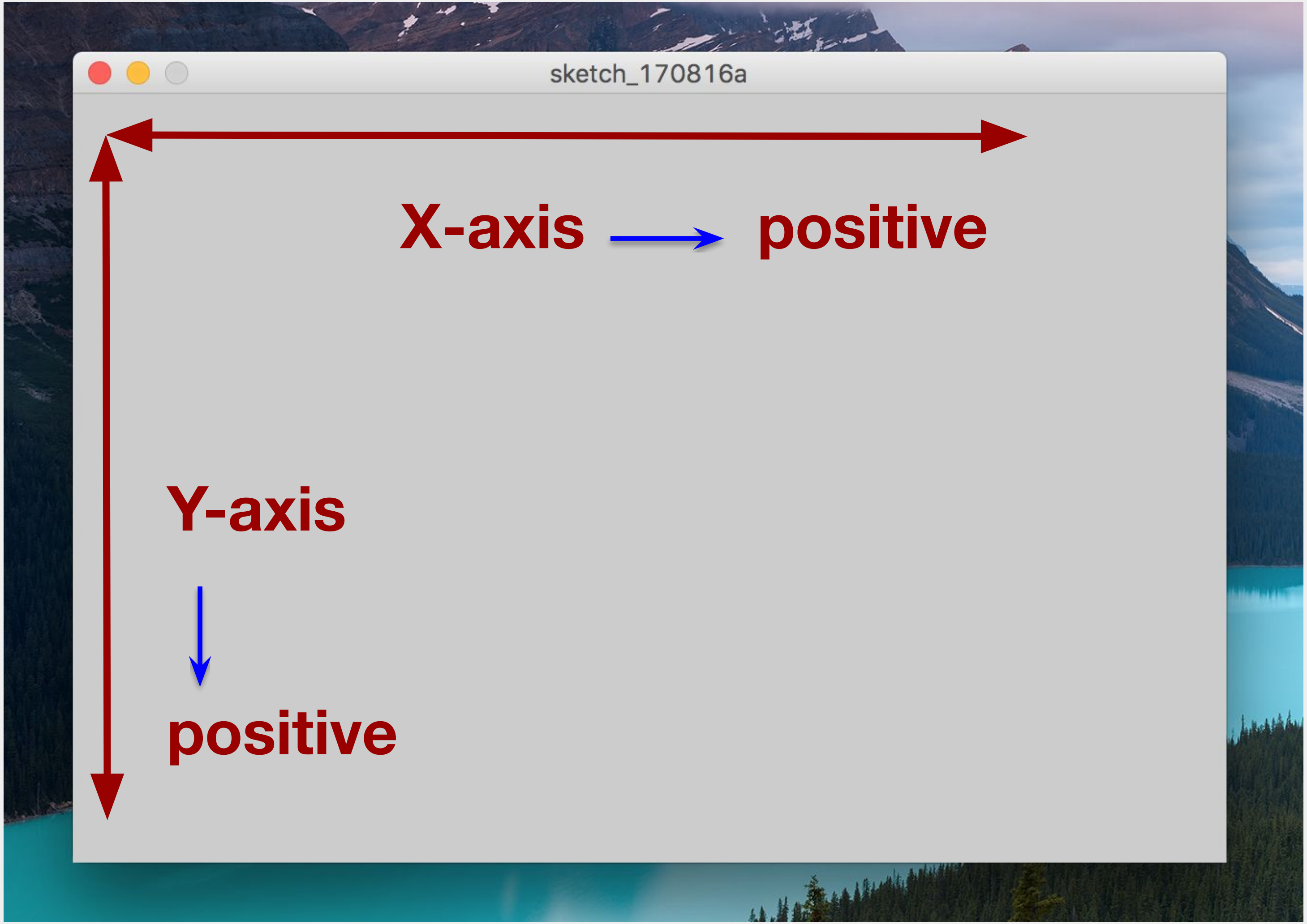
```
ellipse(50, 50, 80, 80);
```

This line of code means “draw an ellipse, with the center `50` pixels over from the left and `50` pixels down from the top, with a width of `80` pixels and height of `80` pixels”

The Canvas

- As mentioned, processing programs are visual
- Graphics are drawn onto the ***canvas***
- The canvas is a grid of tiny pixels
  - Arranged in rows and columns
- We specify where we want things to be drawn on the processing canvas using pixel coordinates
- BUT, the coordinate system is oriented in a different way…



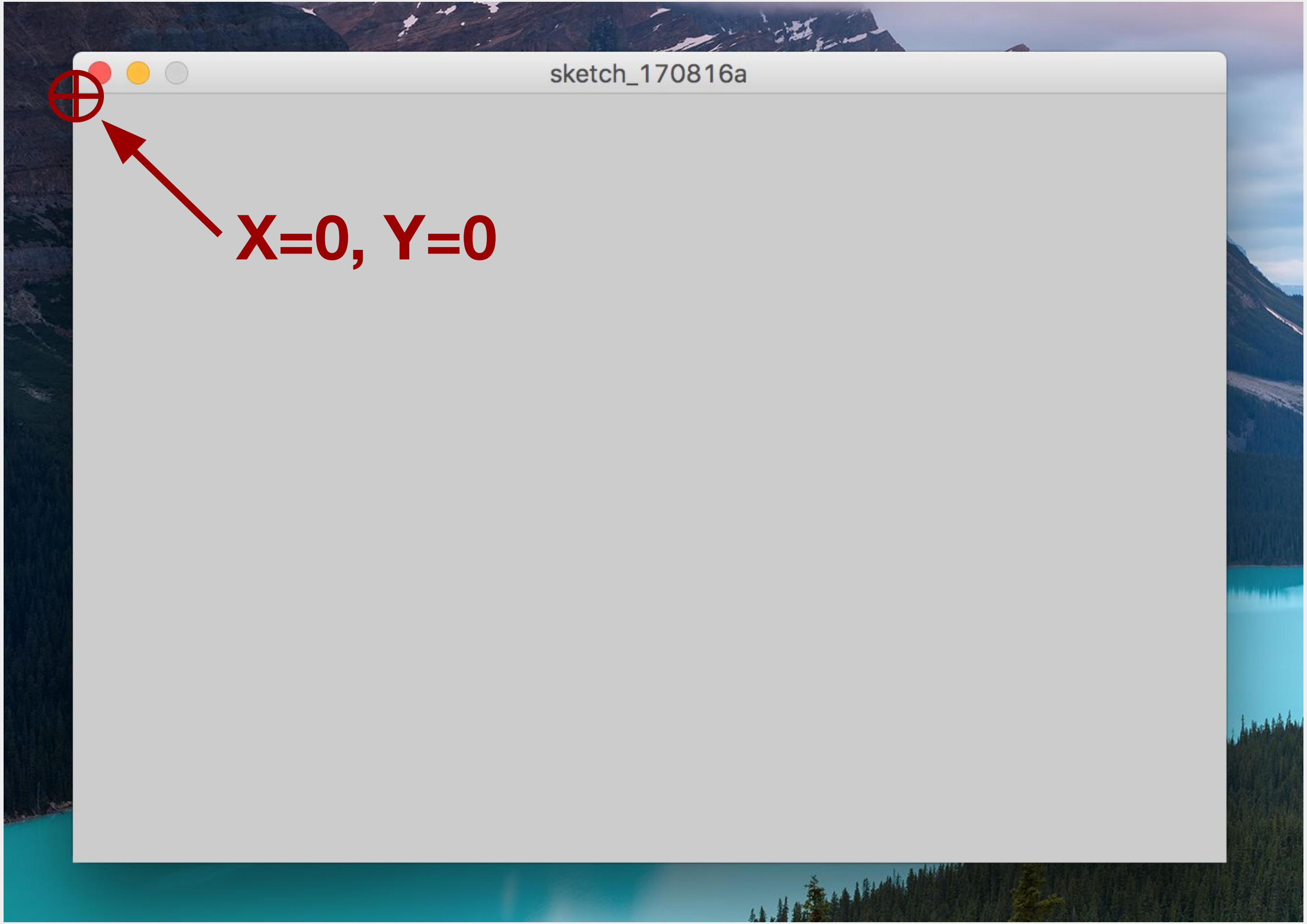


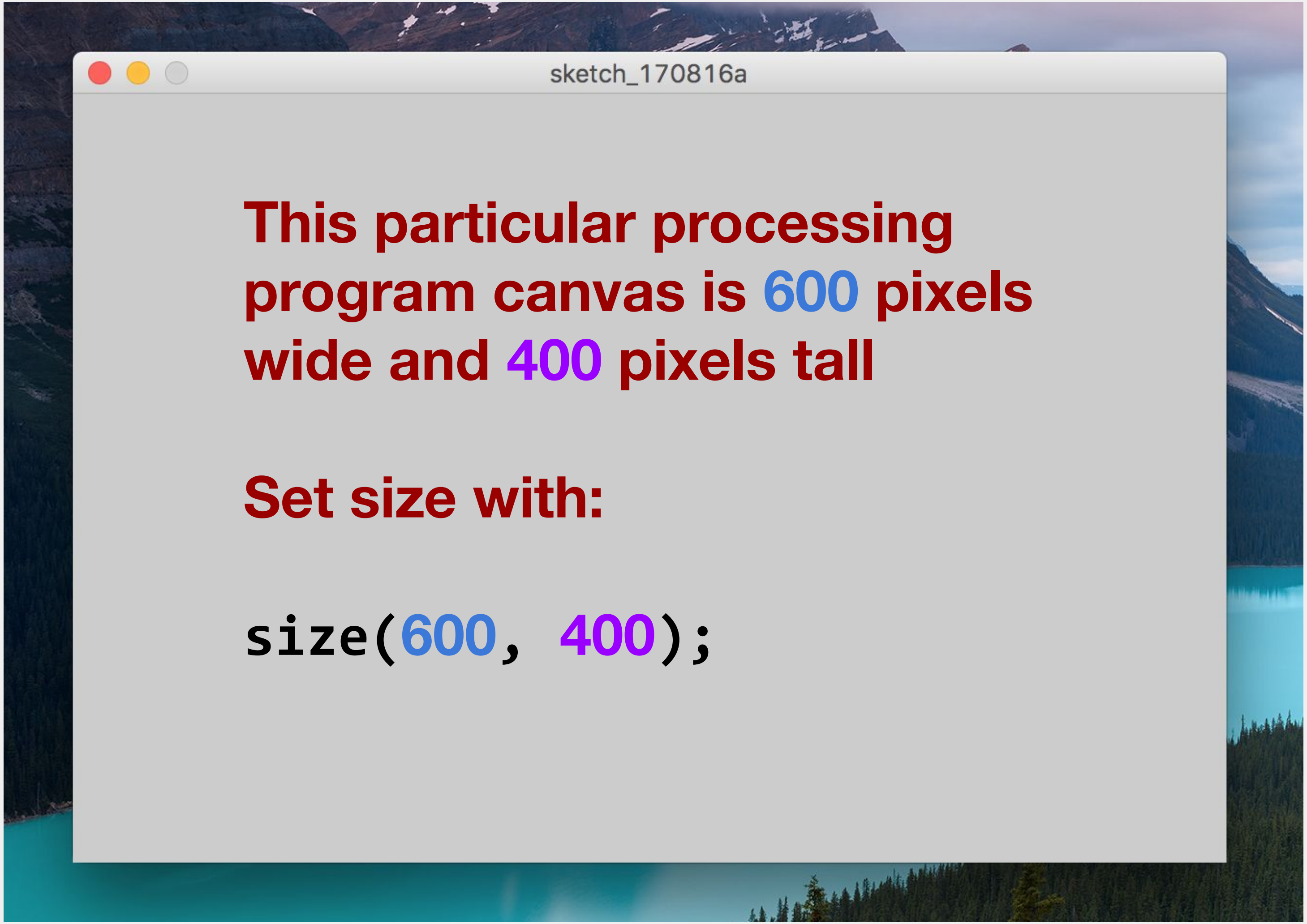
X-axis → positive

Y-axis

↓

positive


sketch_170816a
X=0, Y=0



This particular processing program canvas is 600 pixels wide and 400 pixels tall

Set size with:

```
size(600, 400);
```

Demo

- Using the reference, Let’s say I want to
  - Draw a point in the middle of the canvas
  - Draw a circle
  - Color the circle

Remember...

What is **Computer Science** ?

In simpler terms, computer science can be defined as…

Problem Solving *using* ***Computational Techniques***

Problem Solving: The process of finding solutions to difficult or complex issues.

Computational Techniques: Defining a set of steps or instructions to be run by a computer for accomplishing a particular task.

Problem Solving - Dishes

Let’s define the “Dishes” problem in more detail:

The Problem: There is a stack of dirty dishes in the right side of the sink

The Ideal Outcome: All dishes are cleaned and in their proper place

The Solution: . . .

Remember...

Remember...

1) Turn on the water to the left sink
2) Grab the sponge
3) Put some soap on the sponge
4) As long as dishes remain in the right sink
    a) Grab a dish from the right sink
    b) Scrub it well
    c) Place it in the left sink & rinse
5) Grab the drying rag
6) As long as dishes remaining in the left sink
    a) Grab dish from the left sink
    b) Dry it well
    c) Put it in the proper cabinet

ICA

Exercise 1 - Problem Solving - square

Write (on paper) the steps (in plain English) for the solution to this problem

The Problem: We need to draw a square in the middle of a canvas.

The Ideal Outcome: The drawing of a square that 20 pixels wide in the middle of a 300 by 300 canvas.

The Solution: . . .

1 minute for individual (silent) work

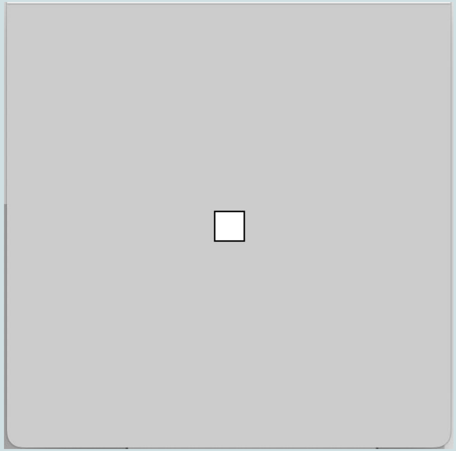
1 minute for group work

Algorithm

The solution:

1) Draw a 300 by 300 canvas
2) Draw a 20 by 20 square centered in the middle of the canvas

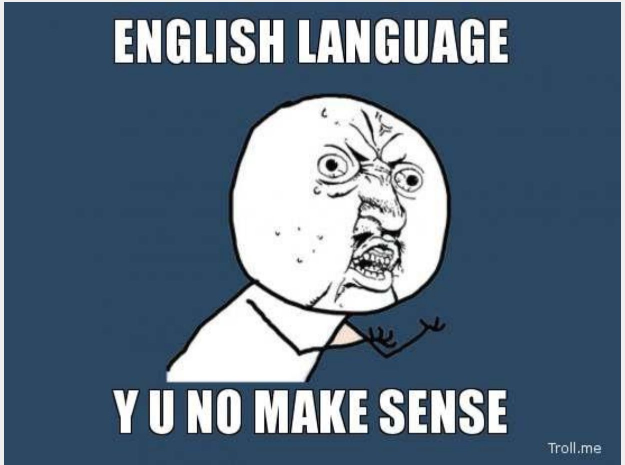
- ***Algorithm** is a set of detailed steps to be followed in problem-solving operations, especially by a computer.*



Remember...

Problem Solving - Algorithm

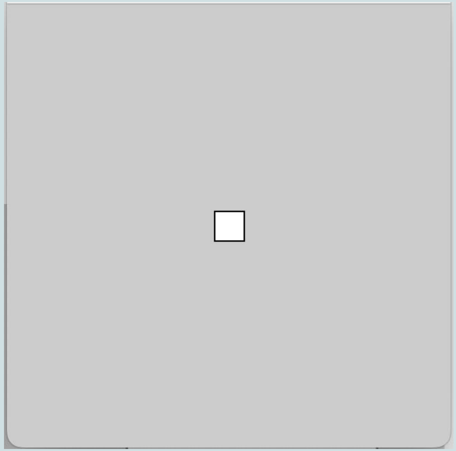
- ***Algorithm** is a set of detailed steps to be followed in problem-solving operations, especially by a computer.*
- We can't just give a computer instructions written in ***English*** like we did in our examples here. ***Computers don't speak English***.



Exercise 2

On paper, write the Processing code to:

1. Draw a 300 by 300 canvas
2. Draw a 20 by 20 square centered in the middle of the canvas



1 minute for individual (silent) work

3 minutes for group work (share your answer)

Exercise 2

Comments //

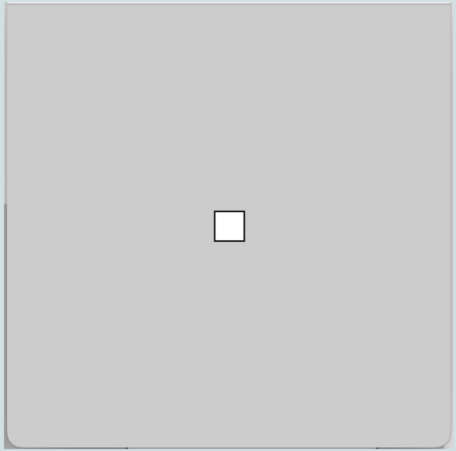
Comments help us write and understand code

//this is a comment and can be written in English. I does not do anything

//TODO: Draw a 300 by 300 canvas
//TODO: Draw a 20 by 20 square centered in the middle of the canvas

Exercise 2

Add comments to your code



1 minute

Example

```
size(300, 300); //Draws the canvas
square(140, 140, 20); //Draws the square
```

This example *calls two functions*

```
size(300, 300); //Draws the canvas
square(140, 140, 20); //Draws the square
```

Functions

- As a programmer, you tell the Processing language what, where, and how to draw things by calling **functions**
- A **function** is a sequence of code that can be “called” or “invoked” by calling it
- These functions were “defined” by a programmer and you will learn to define your own functions

***Algorithm** is a set of detailed steps to be followed in problem-solving operations, especially by a computer.*

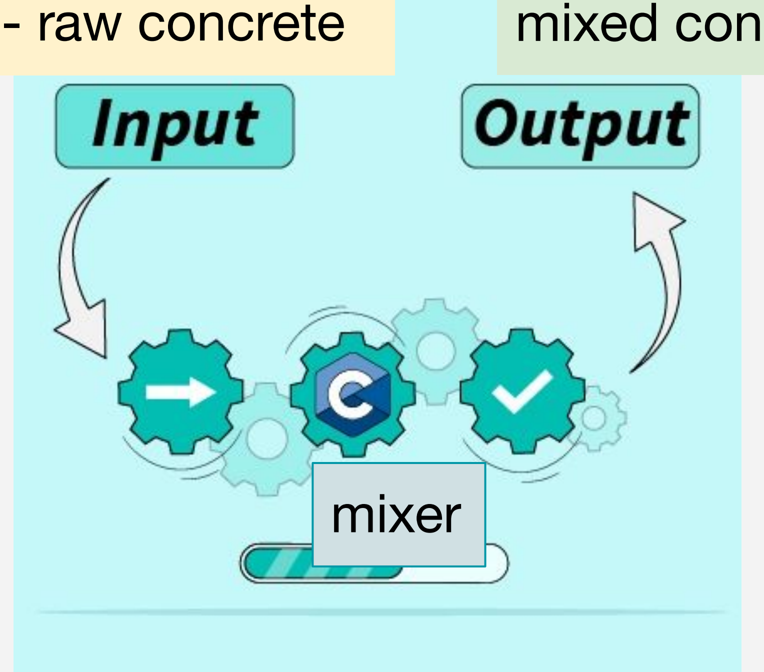
Functions

- When you call a function, you must give the function 0 or more **arguments/parameters/input**
  - A argument is a bit of information that you can give the function to control what it does
  - The order that you write argument in matters!
  - Each of the functions you've used take a few arguments

Function (method) = actions or verbs

- water
- raw concrete

mixed concrete



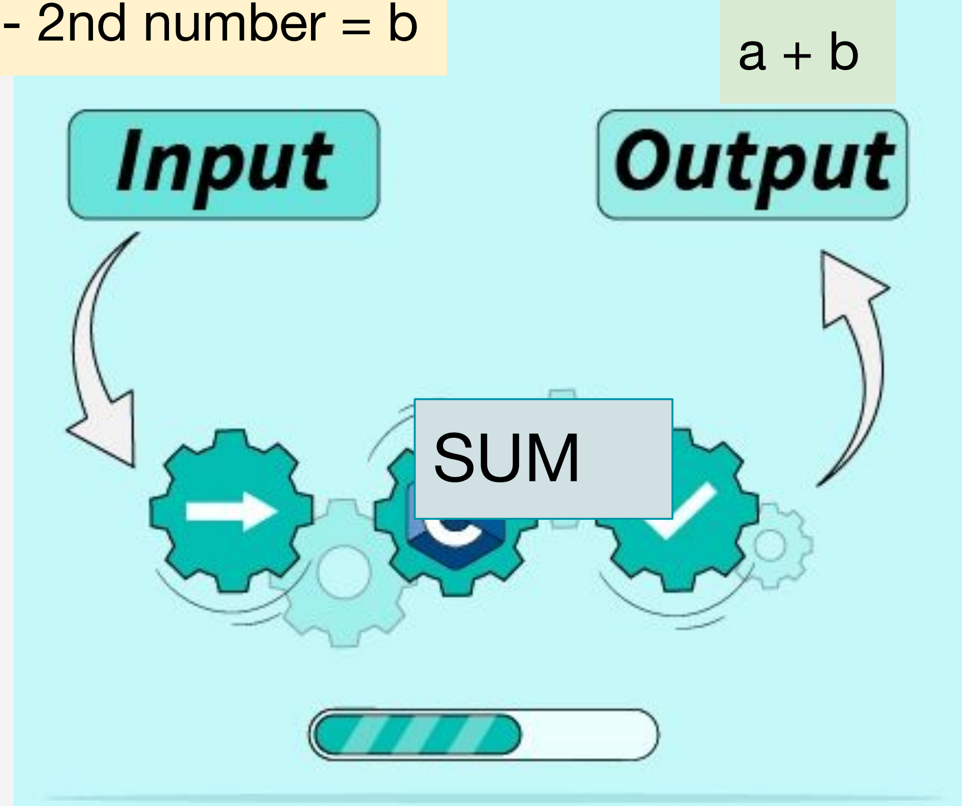
mixer

Mixing Concrete

1) Pour/spray 0.75 gallons of water into mixer
2) Cut open 1 bag of concrete
3) Pour bag concrete into mixer
4) Turn on mixer
5) If too stiff
   a) Add more water
6) If too watery
   a) Add more concrete mix
7) Pour concrete out of mixer

Function (method) = actions or verbs

- 1st number = a
- 2nd number = b



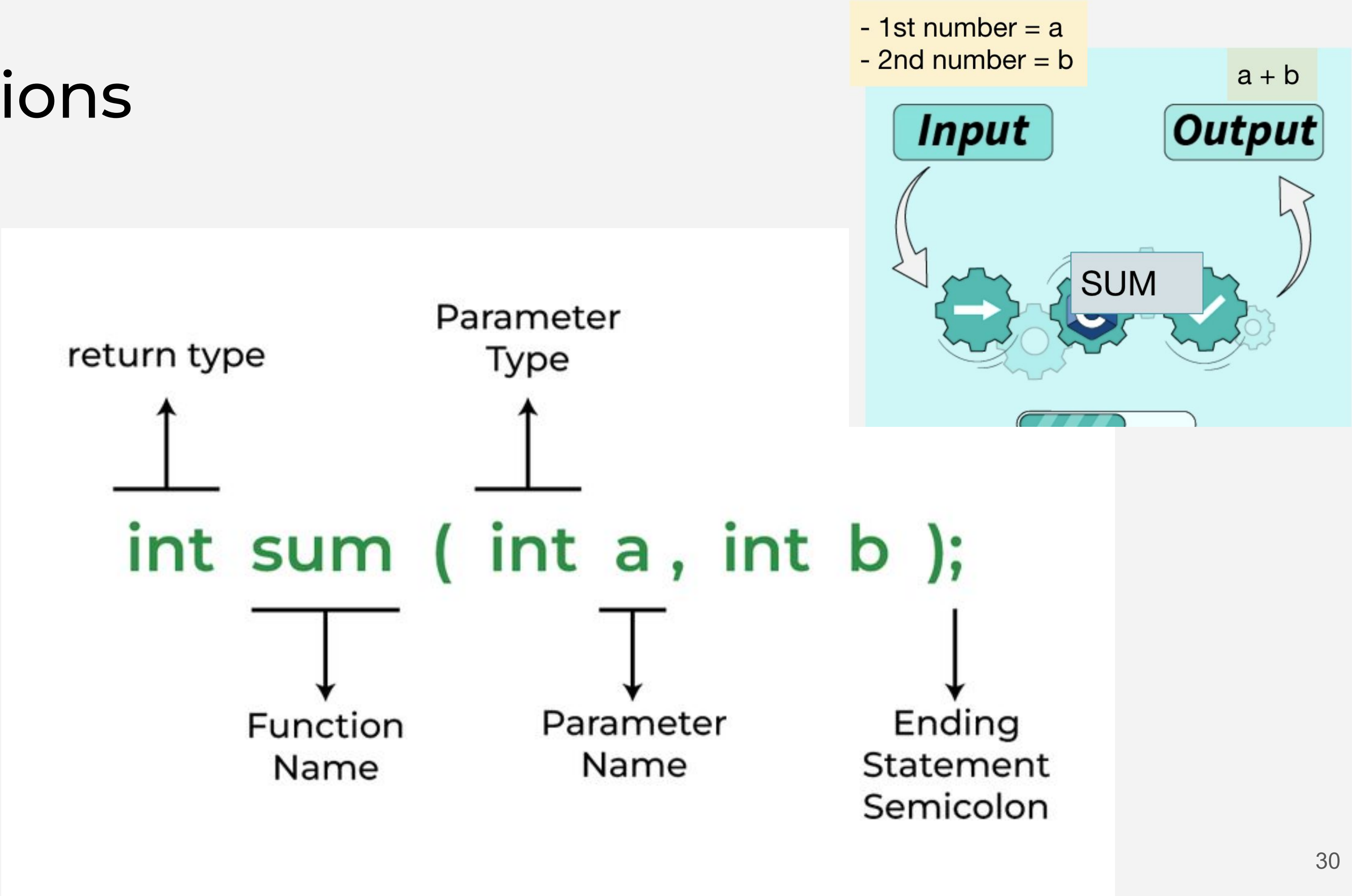
a + b

SUM

Sum two numbers

1) Turn on adder
2) Choose first number
3) Choose second number
4) Compute the sum

Functions



- 1st number = a
- 2nd number = b

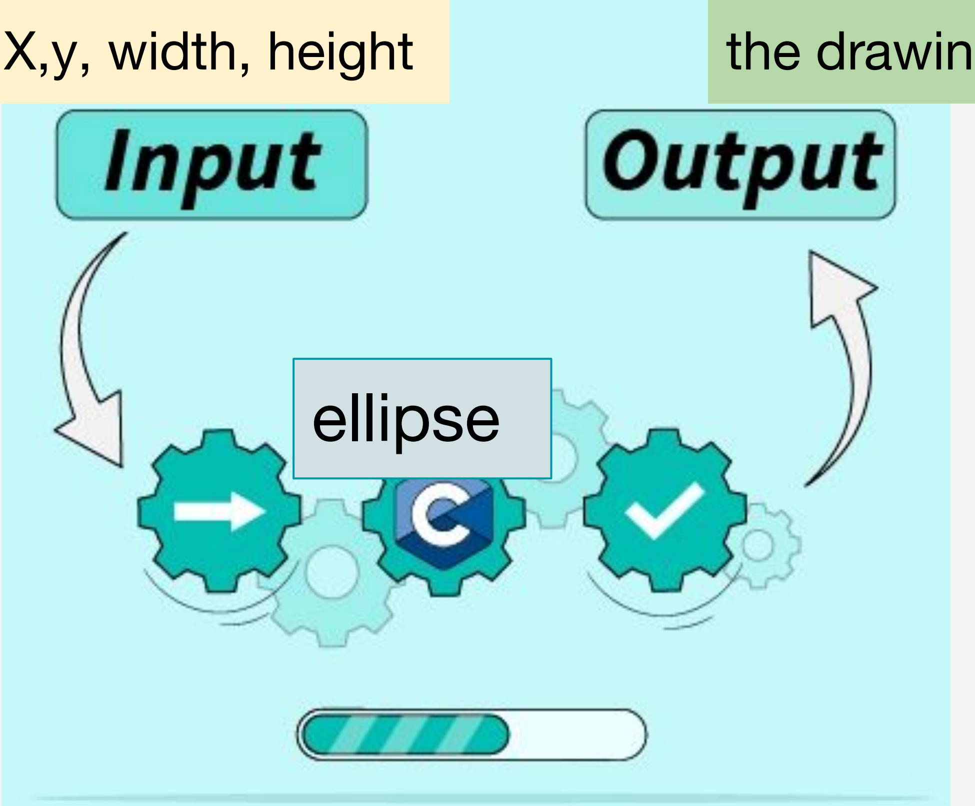
a + b

SUM

Function (method) = actions or verbs

X,y, width, height

the drawing of the ellipse



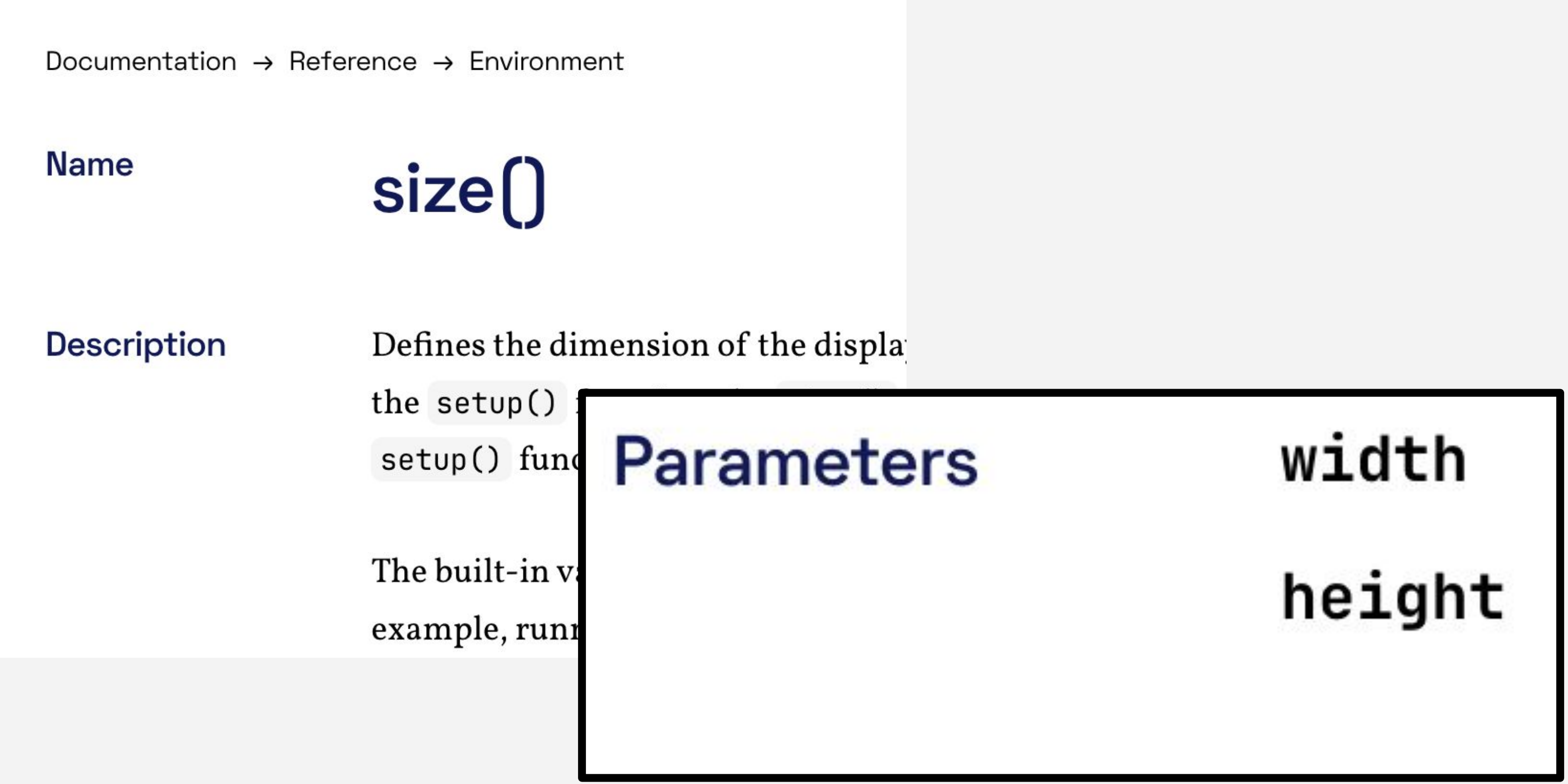
ellipse

the “ellipse” function draws an ellipse

Functions on Processing

- `ellipse(x, y, w, h)` - A call to a function that draws an ellipse at the x/y coordinate and width/height provided
- `size(w, h)` - A call to a function that sets the size of the processing drawing canvas
- `rect(x, y, w, h)` - A call to a function that draws a rectangle at the x/y coordinate and width/height provided
- . . . and more!

Example Arguments Function “size”



Documentation → Reference → Environment

Name

size()

Description

Defines the dimension of the displa

the `setup()`

`setup()` func

The built-in v

example, runn

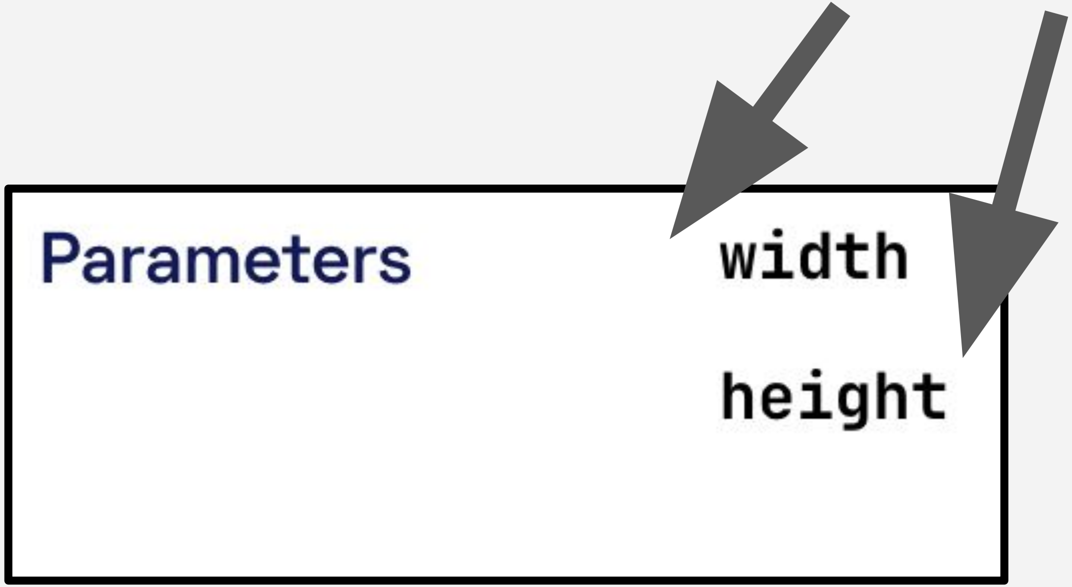
Parameters

`width`

`height`

Example Arguments Function “size”

```
size(500, 600);
```



Parameters

width

height

The order is very important!

ICA

Exercise 3

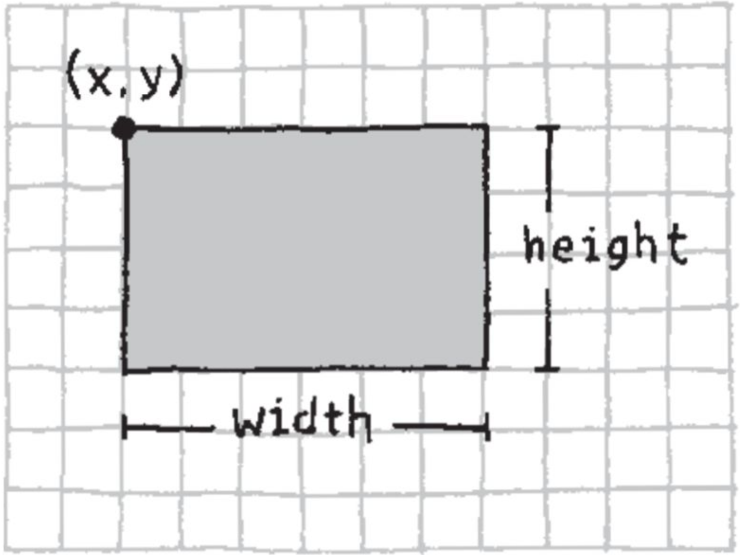
1. Using the reference, identify and list the arguments/parameters/input for the functions:

   - **`rect`**
   - **`triangle`**
   - **`line`**
   - **`point`**

1 minute for individual (silent) work

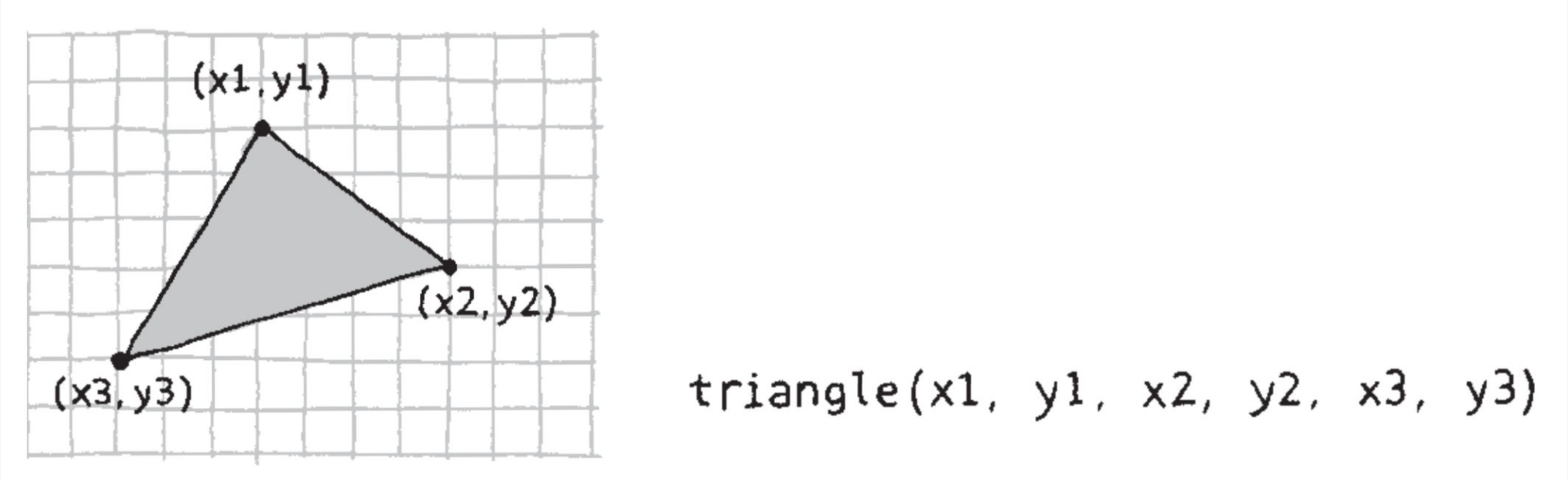
3 minutes for group work (share your answer)

Function rect



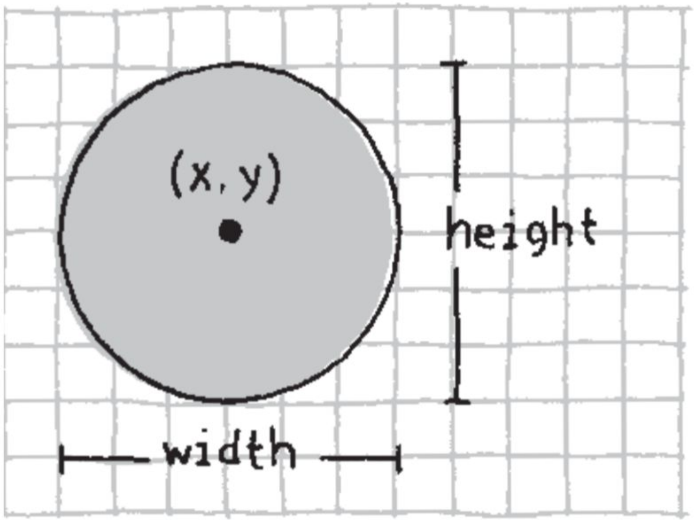
```
rect(x, y, width, height)
```

Function triangle



```
triangle(x1, y1, x2, y2, x3, y3)
```

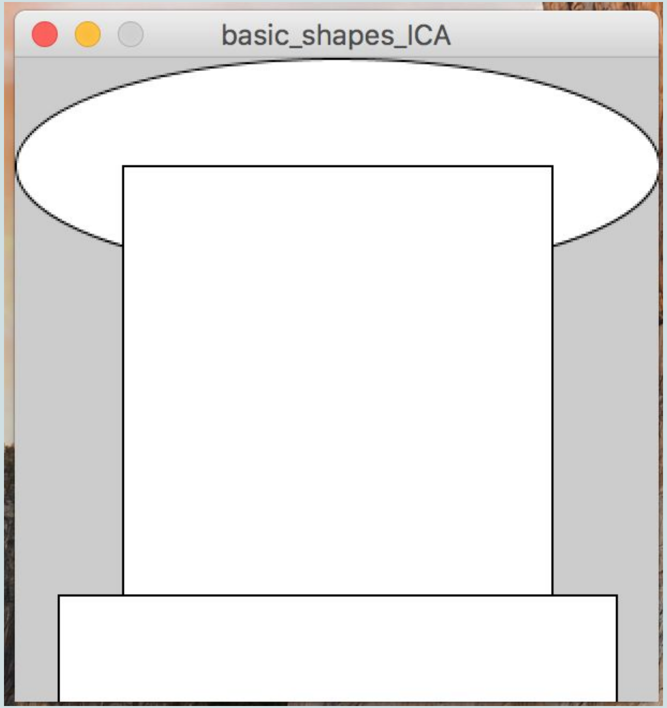
Function ellipse



```
ellipse(x, y, width, height)
```

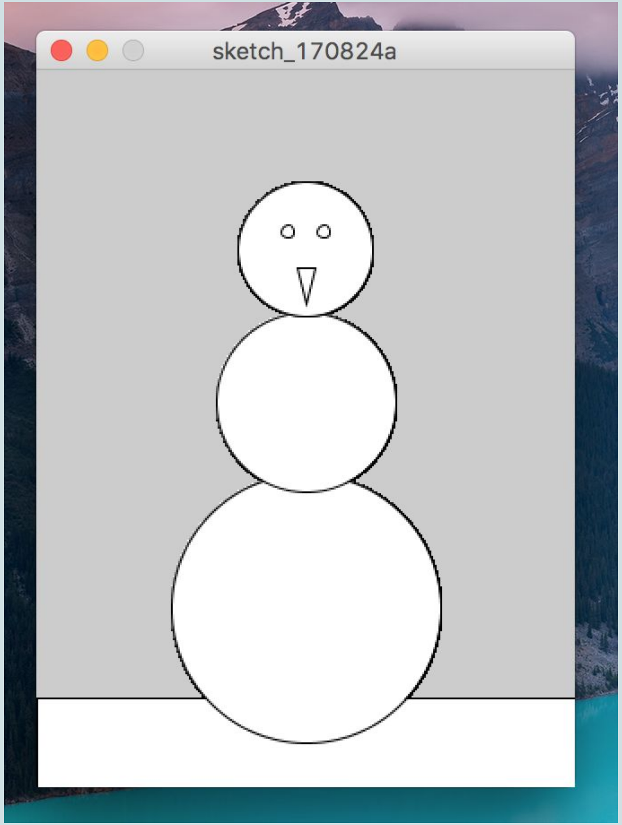
Exercise 4

1. Write the steps (in plain English) to draw these basic shapes.



Exercise 5

- Write the steps (in plain English) to draw a simple snowman like the one to the right.
- Translate these instructions to Processing language
- Test your code in your laptop.


sketch_170824a