

# Calibration & Error Calculation

Photoresistors



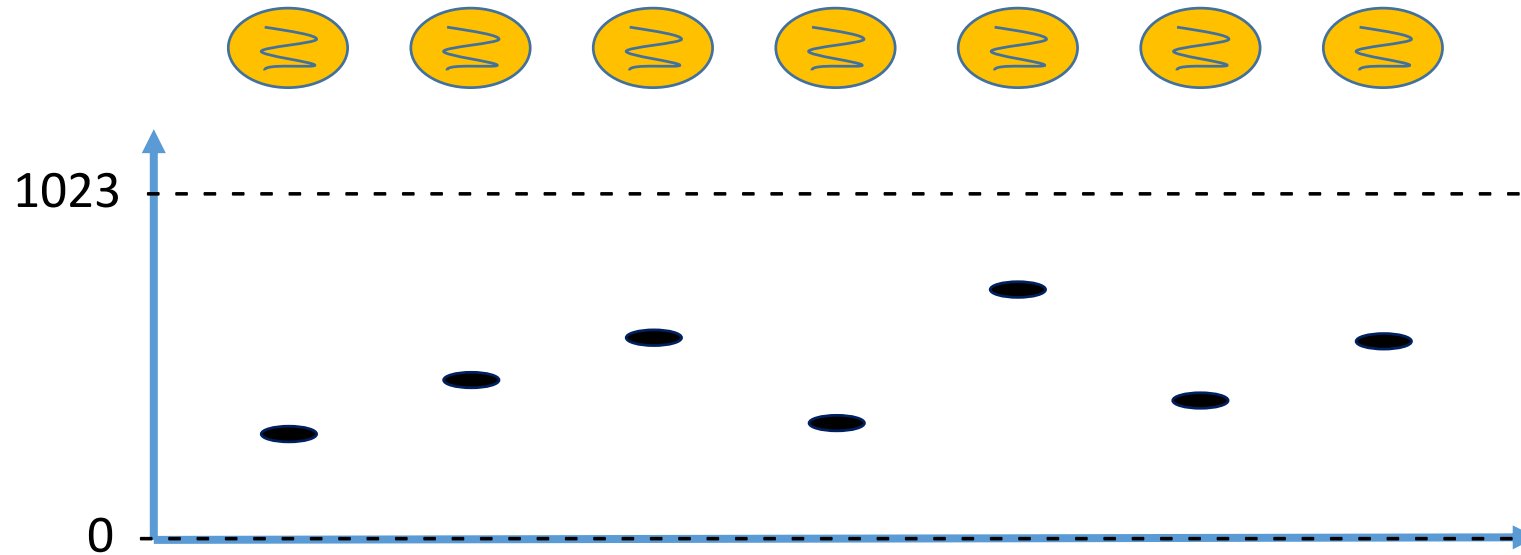
- What we know we can do:
  - Read 7 values with `analogread()` ranging in values from 0 – 1023
- Questions needing answers:
  1. When is a photoresistor over a black line or a white surface?
  2. How do I quantify the error... what is error?

Photoresistors



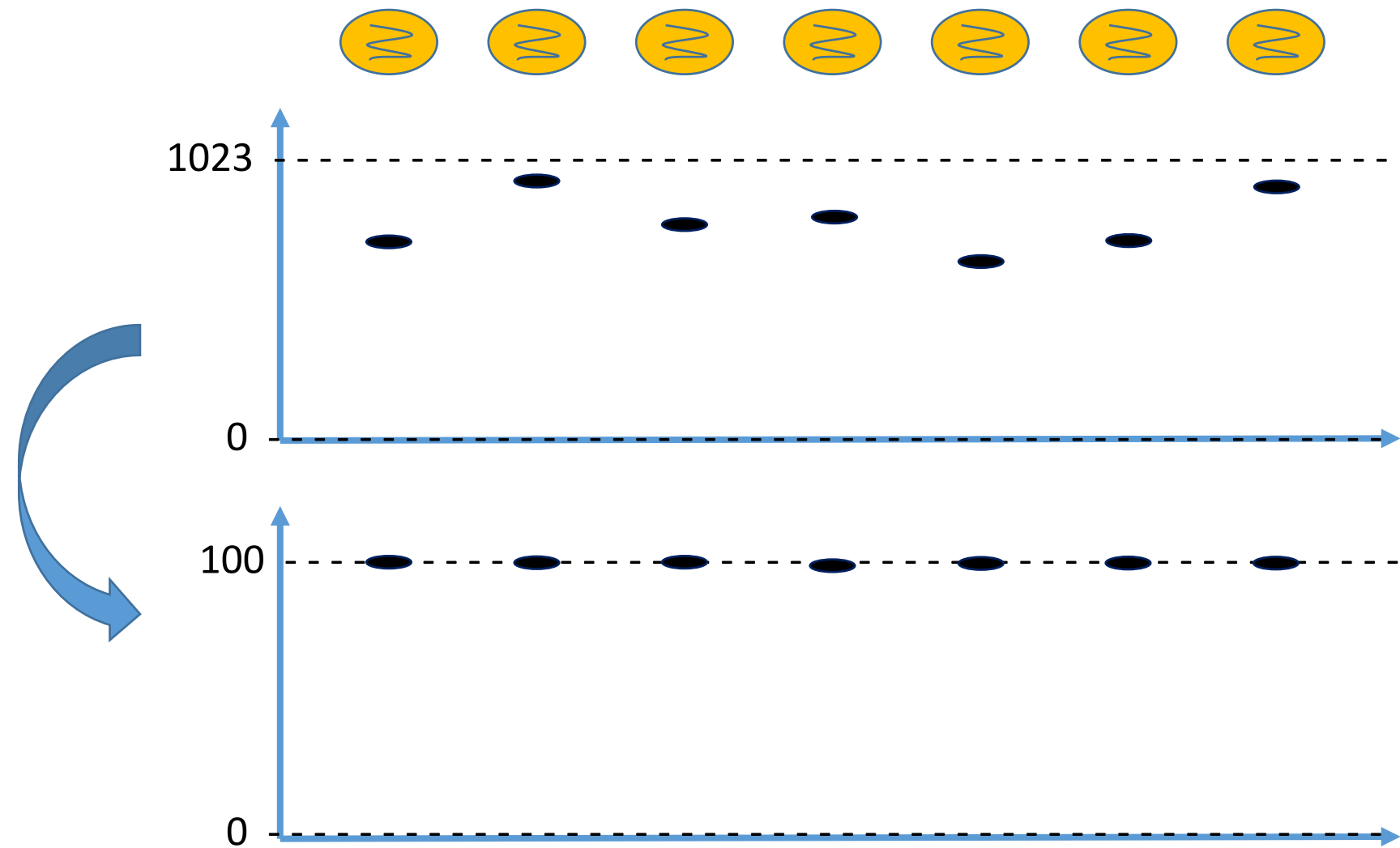
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# Calibrate!



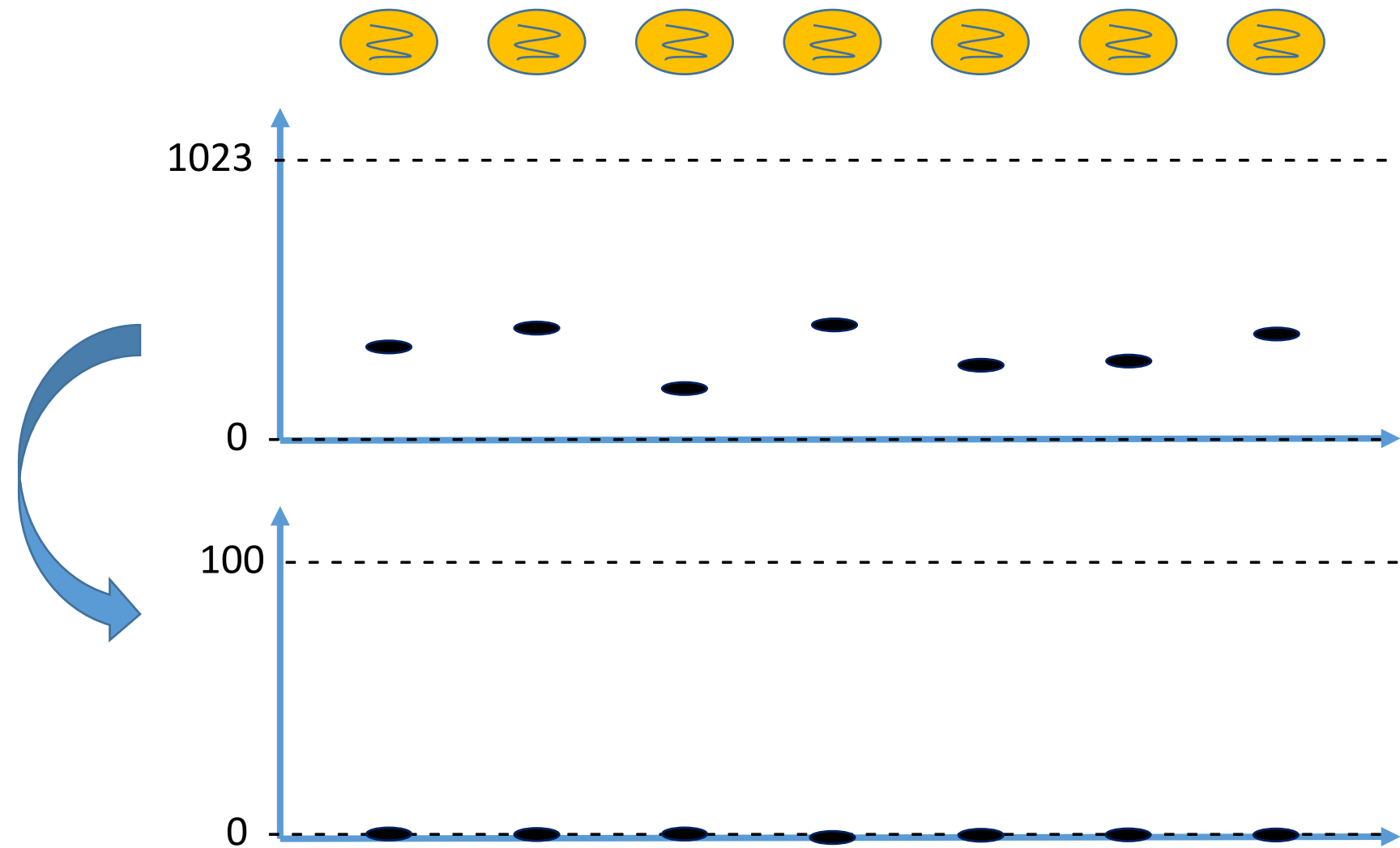
Remember these photo resistors get read by your Arduino as an integer between 0 and 1023.  
But what is black and what is white?

# Calibrate! - Black



Map From Read values  
to a value from 0 – 100.  
Look at Lab #4 for more  
help.

# Calibrate! - White



# Calibrate! - When



```
sketch_mar01a$  
void setup() {  
  // put your setup code here, to run once:  
  
  // Calibration Code  
  // White Calibration  
  // some delay time  
  // Black Calibration  
  
  // Read Potentiometers  
  
  // Initialize any values  
  
}  
  
void loop() {  
  // put your looped code here, to run repeatedly:  
  
  // Read Photoresistors  
  // Convert values to between 0-100 dependent on Calibration  
  
  // Calculate current line location  
  
  //  
  
  // Calculate error  
  
  // Calculate gain from PID controller  
  
  // Turn  
  
}
```

Calibrate once at the very beginning in the setup{} function.

There are many ways to do this.

One way is to first move the photoresistors over an all white surface. Collect 5 seconds of samples (maybe use for loop and then take average of all samples for each photo resistor).

Allow 5 seconds to move photoresistor over an all black surface (maybe blink LED pin 13 or your own LED during this time so you know you can move it).

Collect 5 seconds of samples while over the black surface similar to the white)

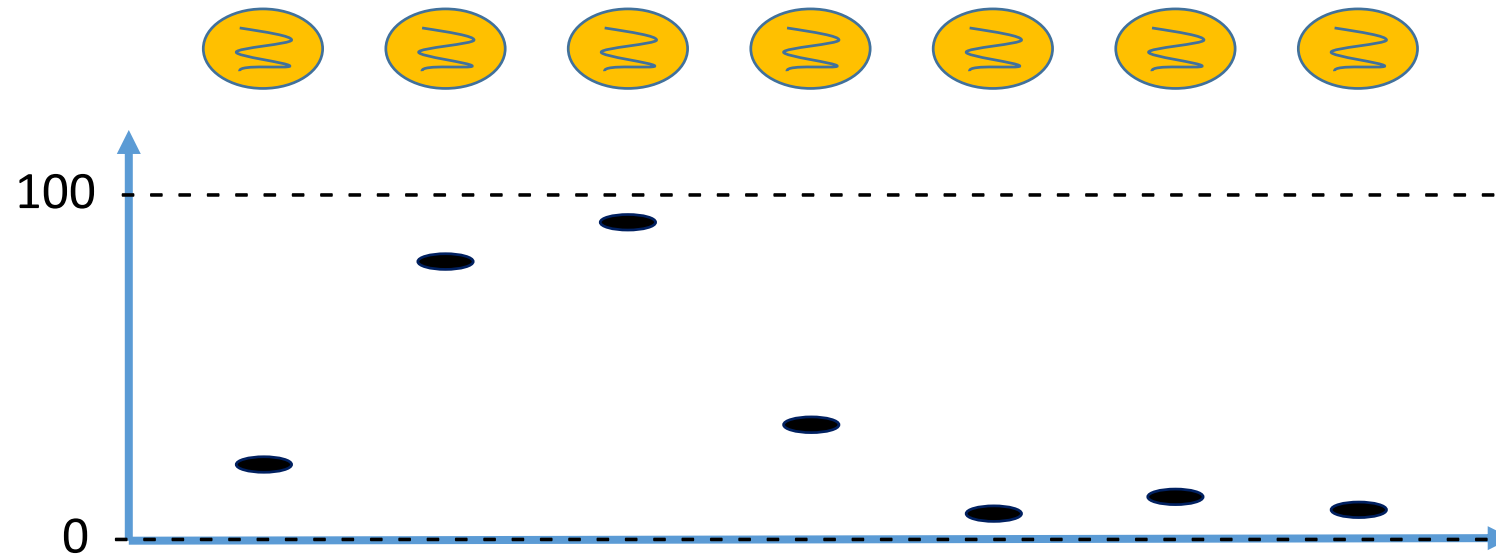
Then execute the rest of your code!

Photoresistors

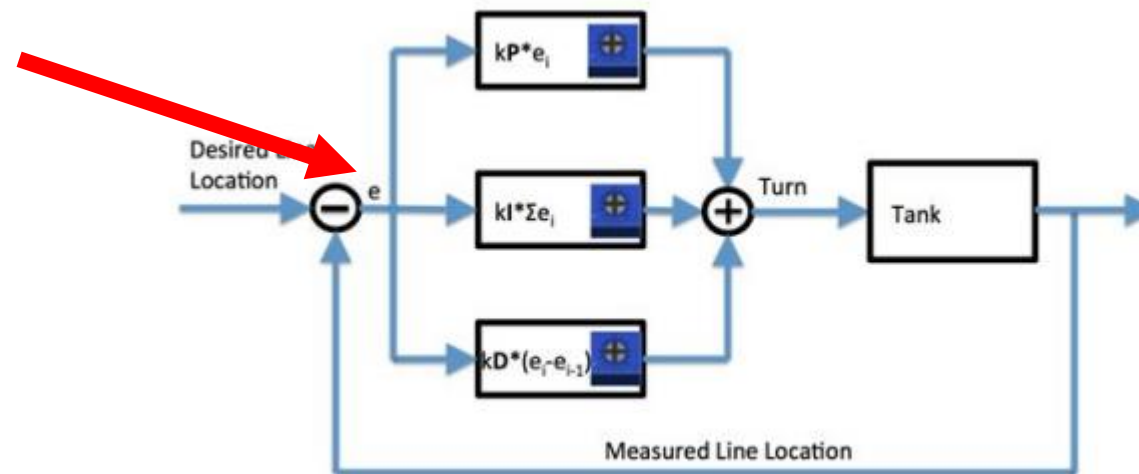


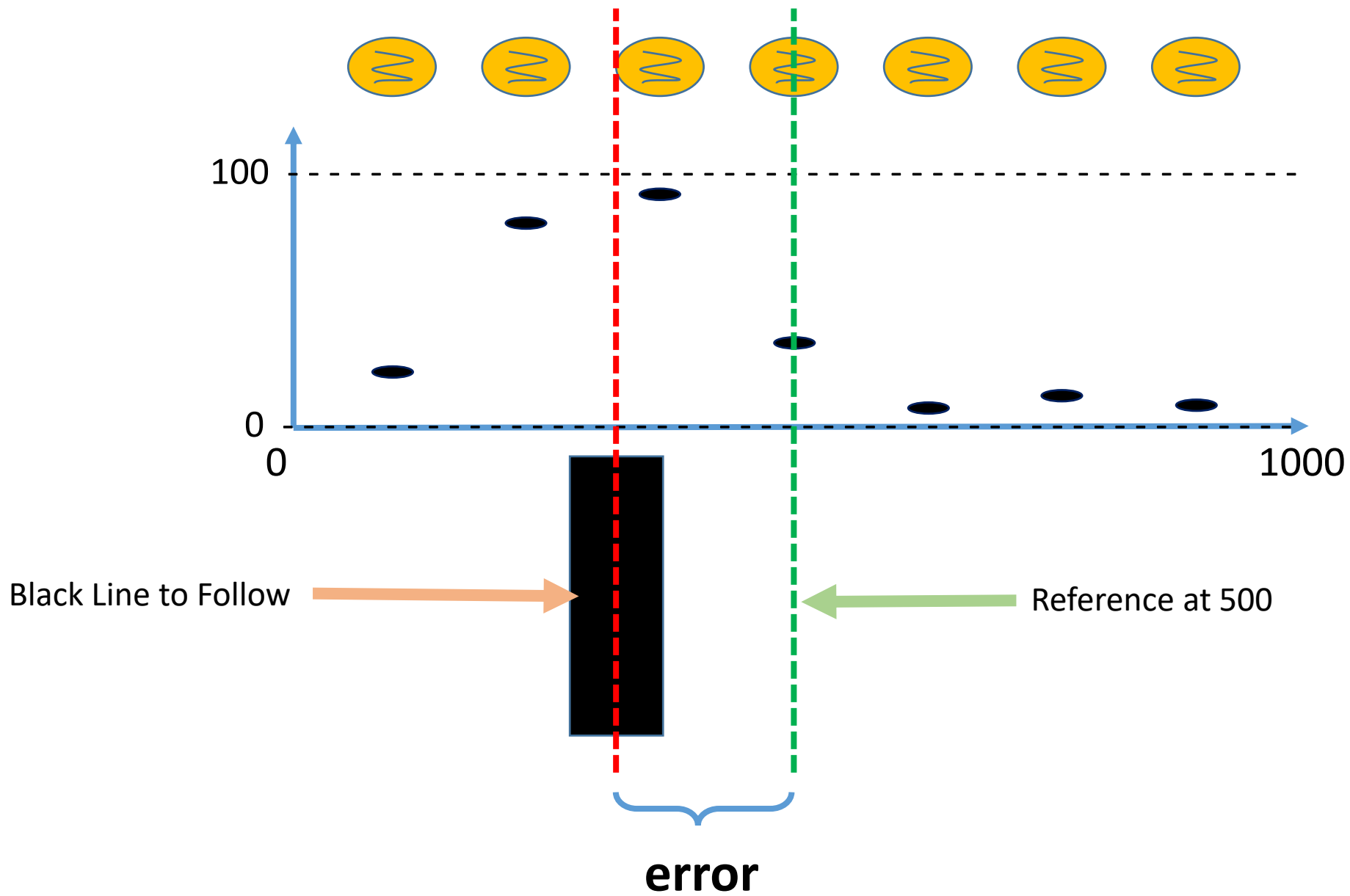
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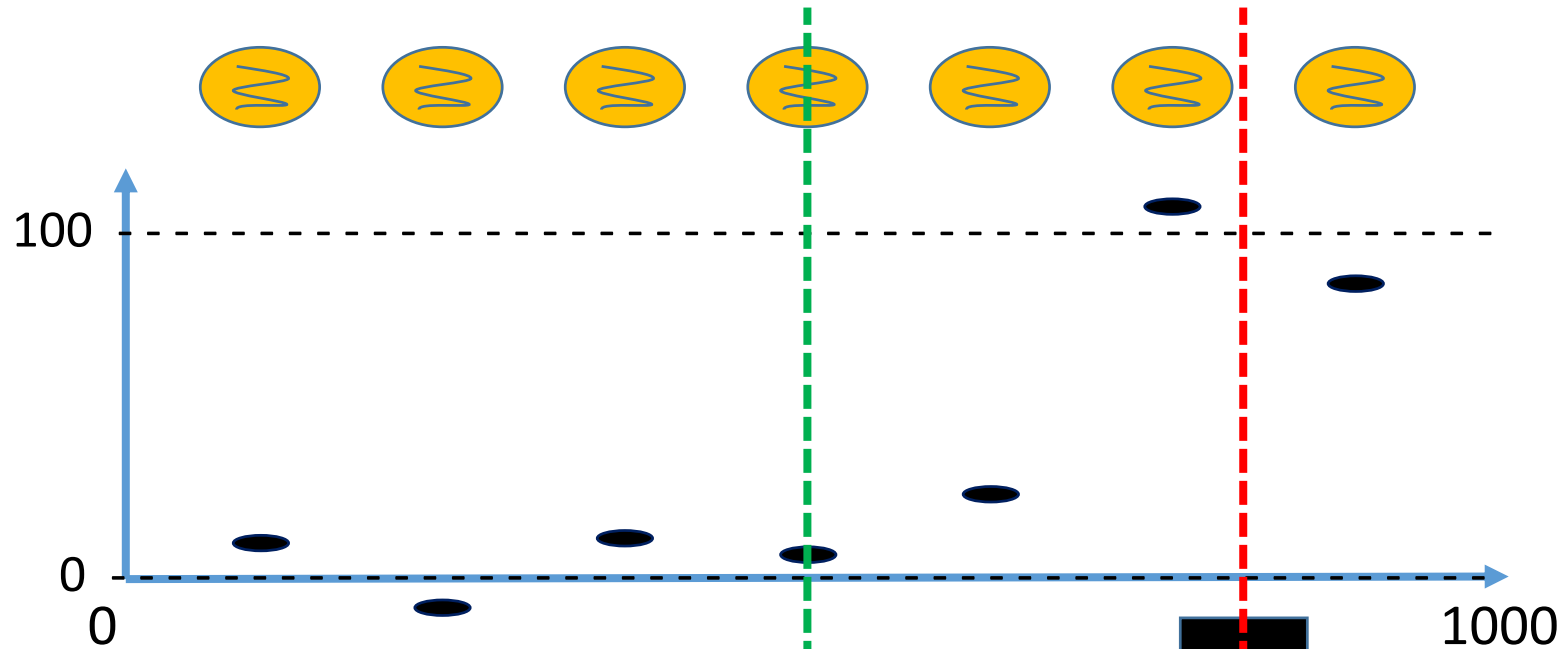




How do you get error (e)?







- Can you notice anything to consider in your code?
  - <100 values
  - >100 values
  - Line <0 or >1000
- What will you do?

**error**