

for loops.

Week 6 | Lecture 1 (6.1)

Upcoming

- Lab 3 Due 11:59 pm Friday.
- Lab 4 released 6:00 pm Thursday.
- Reflection 6 Released Friday 6:00 pm.
- Tutorial (Online), Practical, Office Hour sessions running all week.

if nothing else, write **#cleancode**.

This Week's Content

- Lecture 6.1
 - **for** loops
- Lecture 6.2
 - **for** loops on indices, nested loops
- Lecture 6.3
 - Design Problem: Cryptography

Looping (Iterating)

- Looping means repeating something over and over until a particular condition is satisfied.

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Looping



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Yes/No



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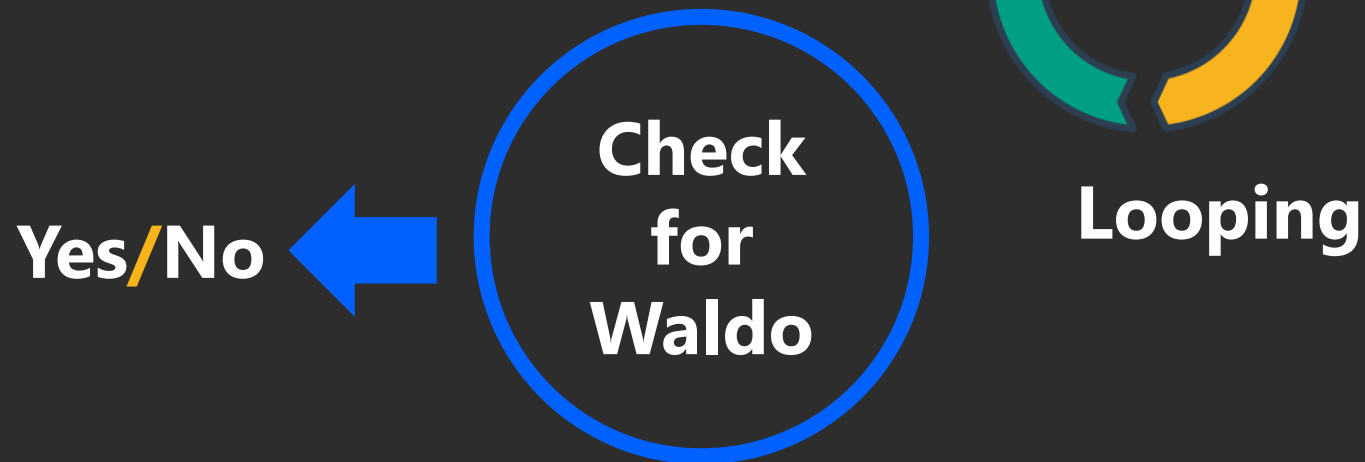
Looping



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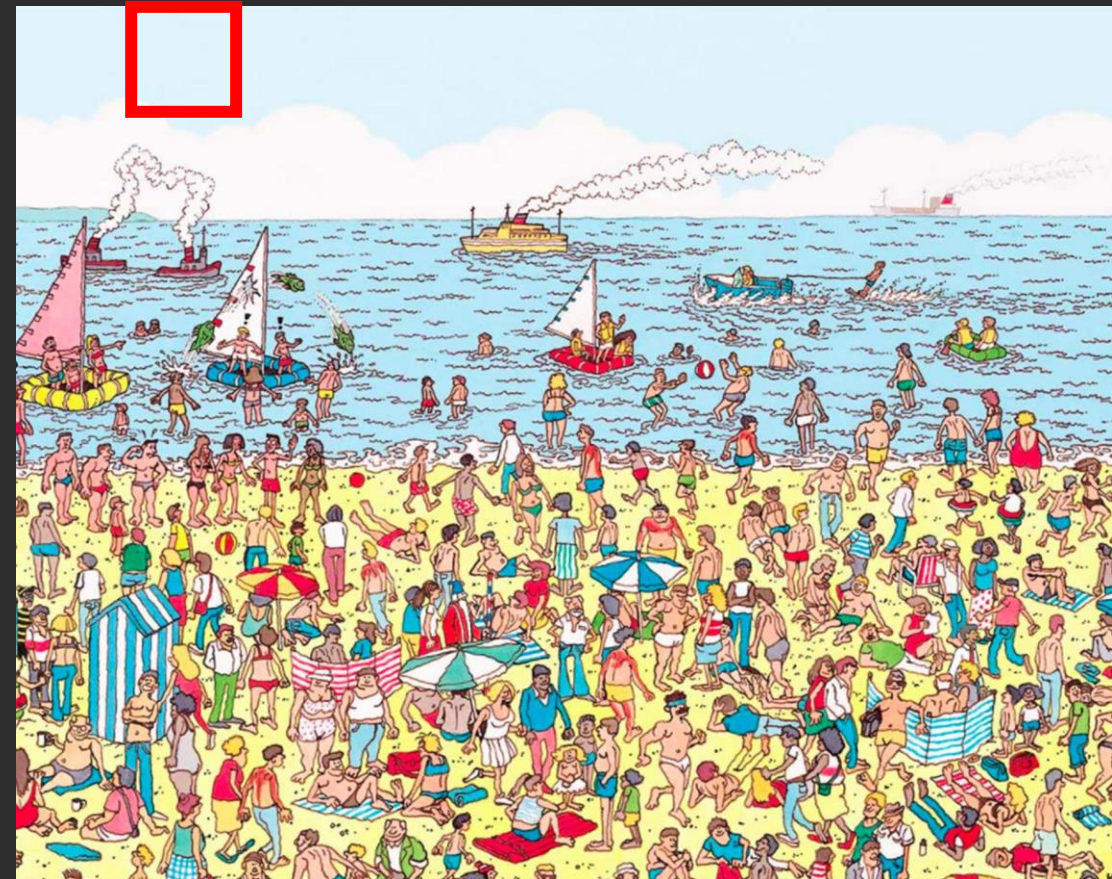
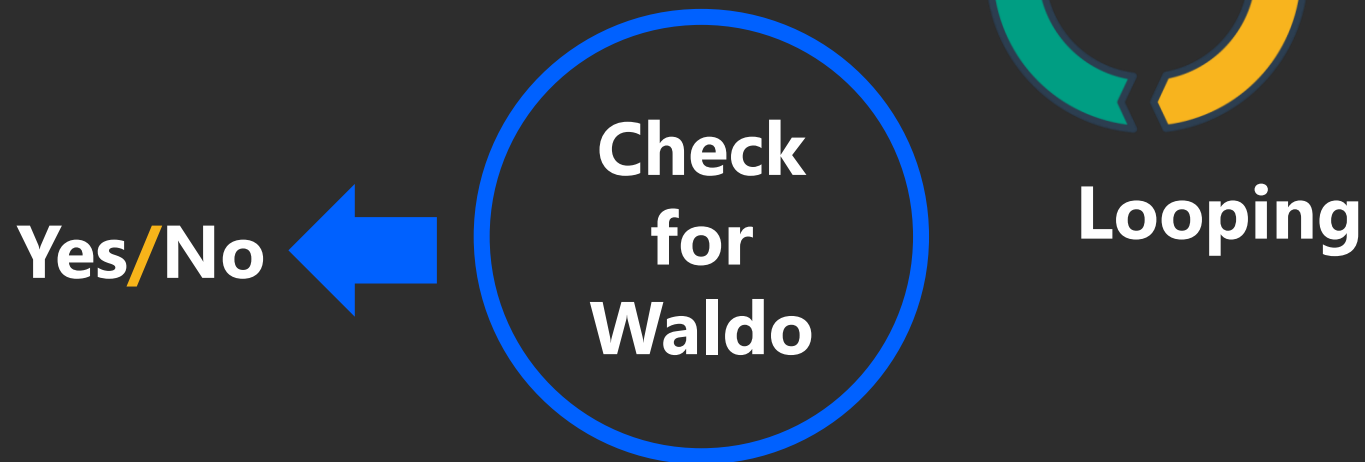
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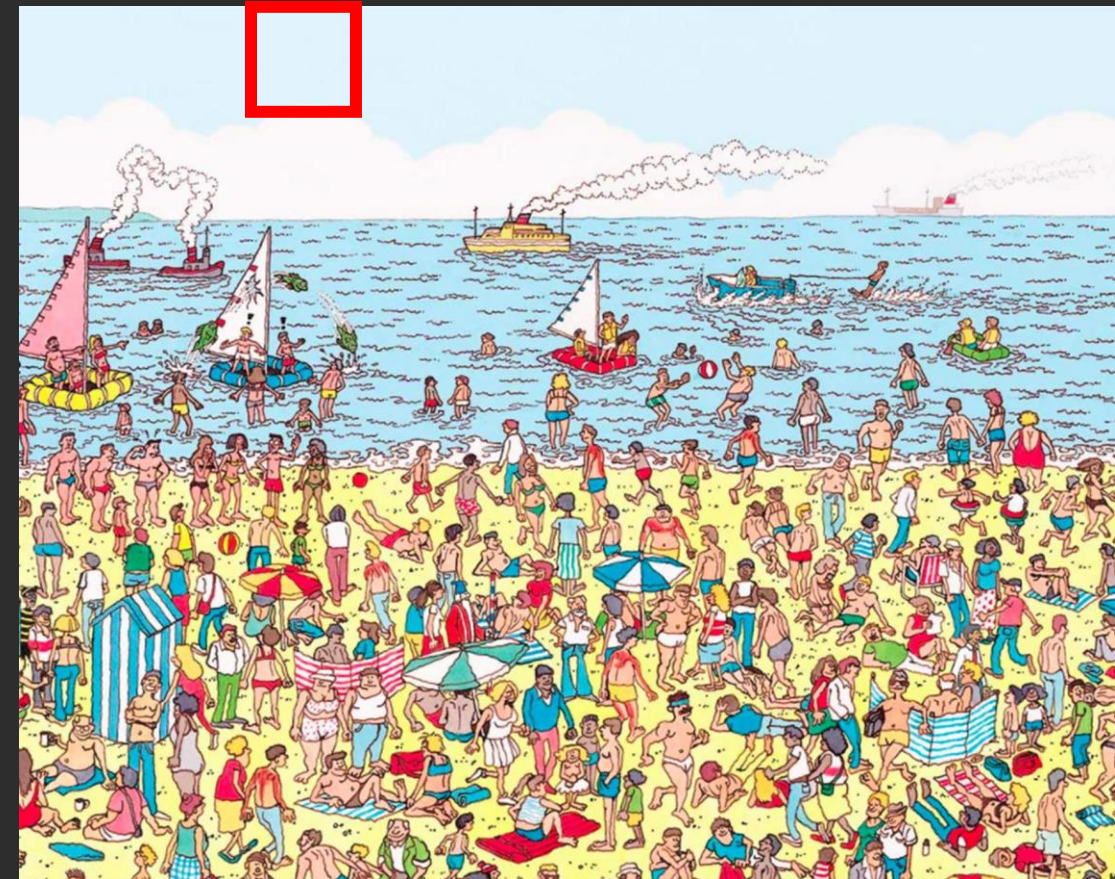
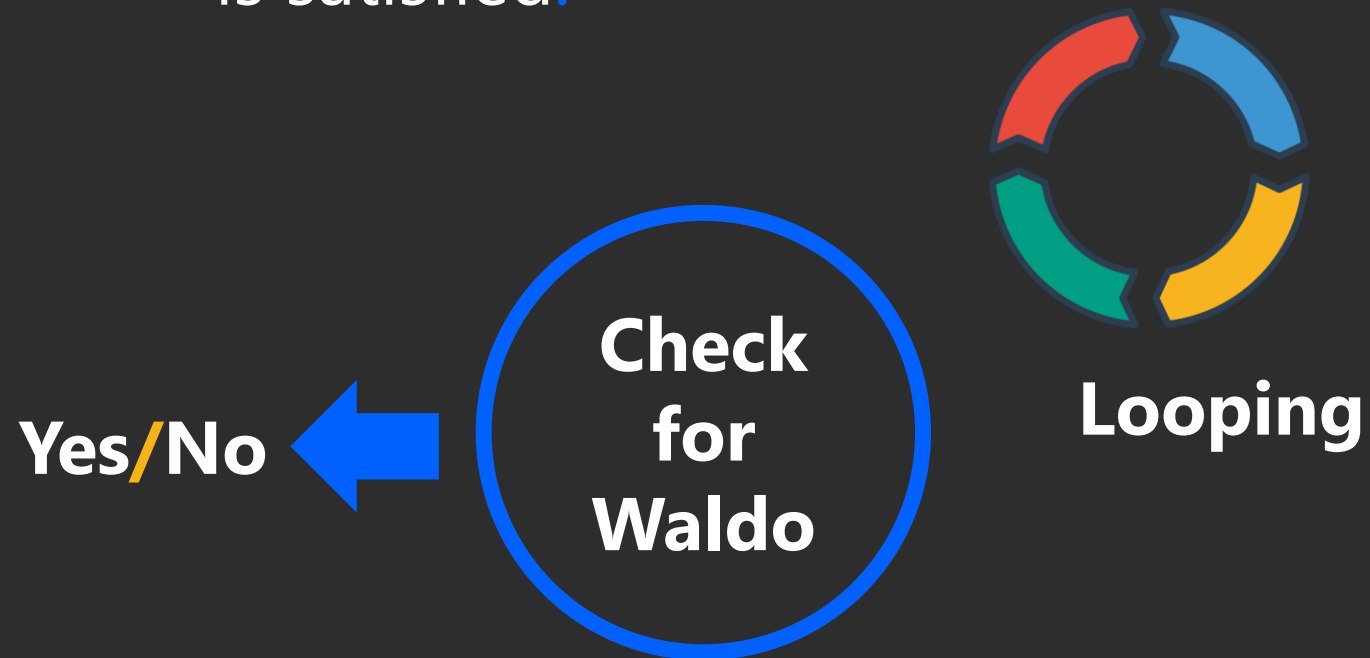
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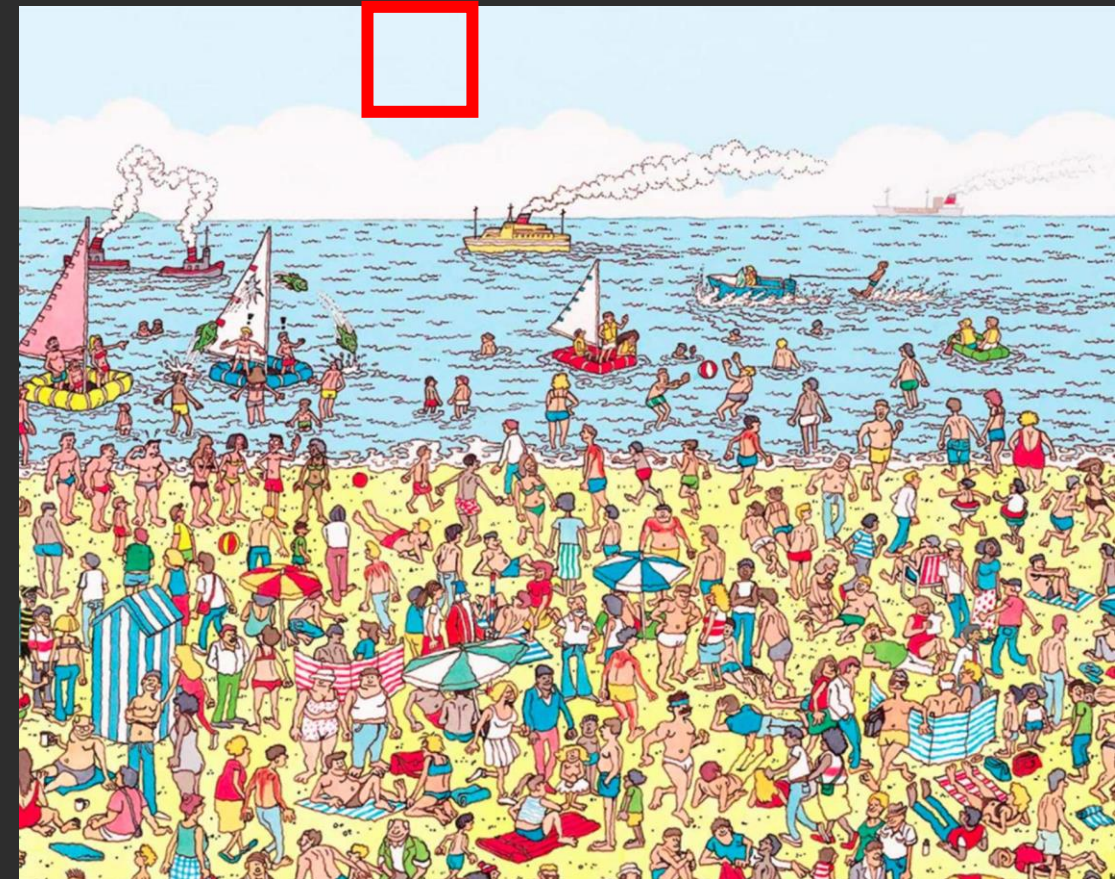
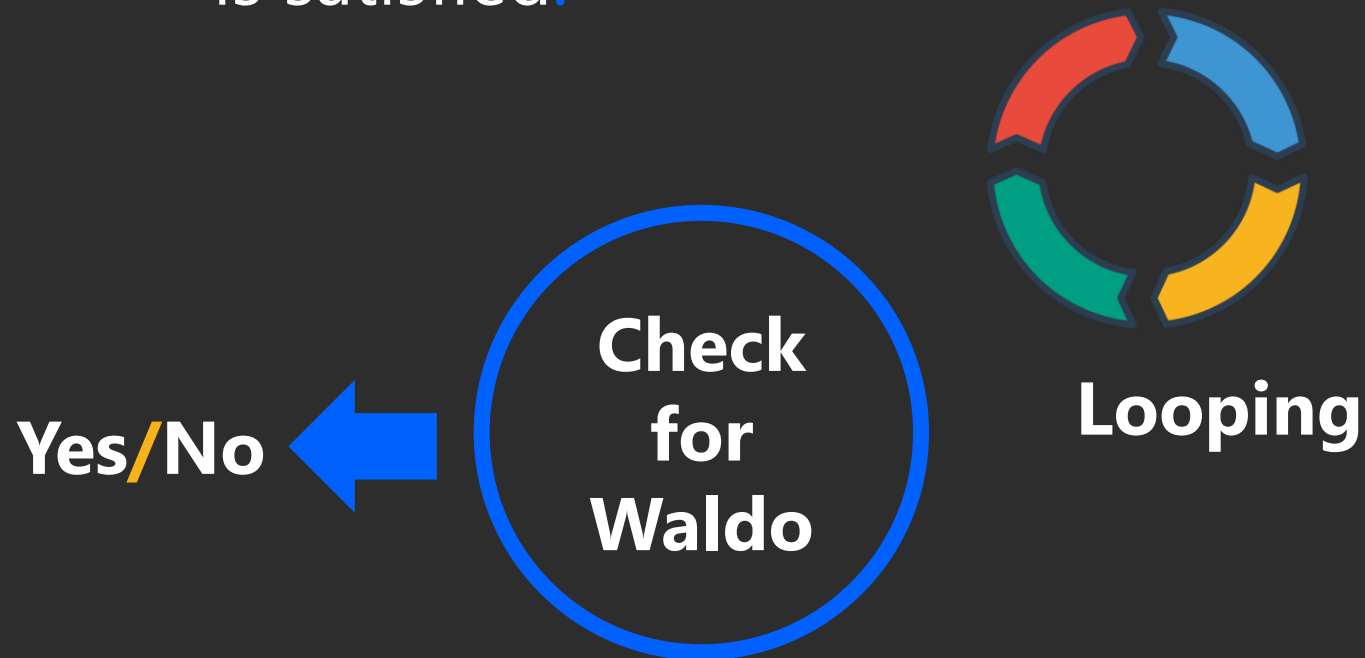
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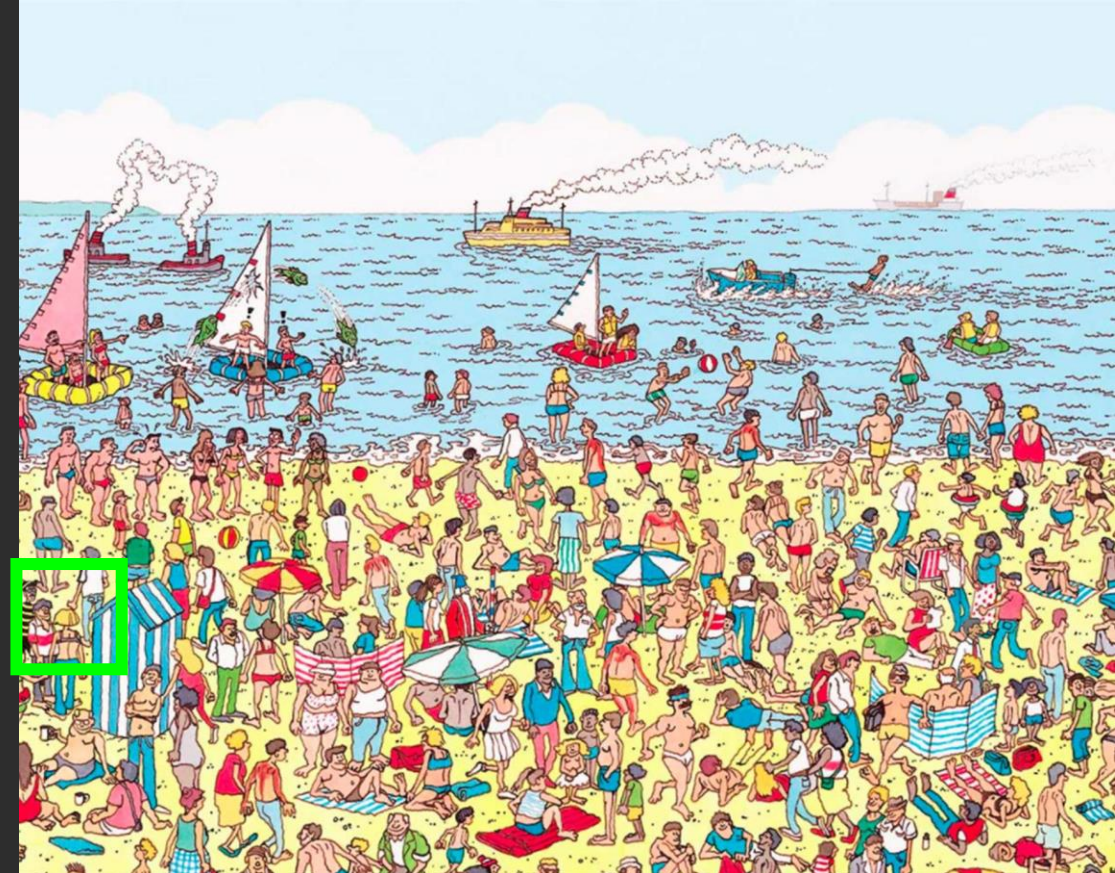
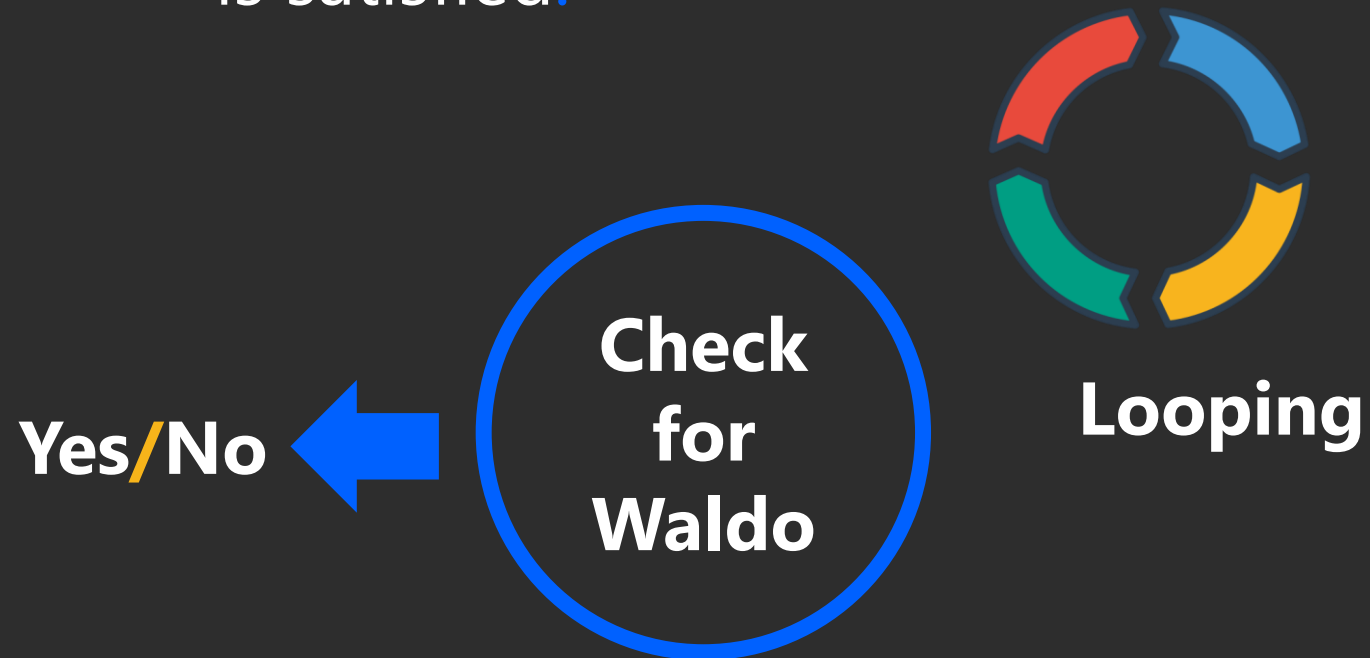
Looping (Iterating)

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Looping (Iterating)

- Looping means repeating something over and over until a particular condition is satisfied.



for loops

- There are several ways to repeat a block of code.
- We've already seen **while** loops and this week, we'll discuss **for** loops.
- Do Something = block of code we want to execute.

```
while expression:  
    do something.
```

```
for item in iterable:  
    do something.
```

for loops

- A **for** loop starts with the keyword **for**.

```
name = 'Sebastian'
```

```
for character in name:  
    print(character)
```

for loops

- Next, we provide the name of one of more variables.
- We have called the variable `character`, but you can call it whatever you like as long as it follows rules for naming a variable.

```
name = 'Sebastian'
```

```
for character in name:  
    print(character)
```

```
for item1, item2 in iterable:  
    do something.
```


for loops

- Our variable `character` will be bound to each of the items in the sequence in turn.

```
name = 'Sebastian'
```

```
for character in name:  
    print(character)
```

for loops

- Specify what the values are in.
- What is the iterable?
- An iterable is an object that can be iterated over.
- Strings are iterable (we know these from last week).
- Lists (**next week**) are iterable.

```
name = 'Sebastian'
```

```
for character in name:  
    print(character)
```

for loops

- As with the `while` loop, the `for` loop statement ends with a colon.
- This is how Python knows you are going to create a new block of code.

```
name = 'Sebastian'
```

```
for character in name:  
    print(character)
```

for loops

- Indenting four spaces tells Python what lines of code are in that block you want to repeated.

```
name = 'Sebastian'
```

```
for character in name:  
    print(character)
```



Indent

for loops

- What output should we get?

```
name = 'Sebastian'
```

```
for character in name:  
    print(character)
```

for loops

- What output should we get?

```
name = 'Sebastian'
```

```
for character in name:  
    print(character)
```

Output:

```
S  
e  
b  
a  
s  
t  
i  
a  
n
```

for loops

- Let's try it ourselves.

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1. Your first for loop

for vs while

- You've learned about **for** loops and **while** loops, but when should you use them?
- Firstly, all **for** loops can be written as **while** loops, and vice-versa.
- You should use a **for** loop when you know how many times the loop should run.
- If you want the loop to break based on a condition (do this until...) you should use a **while** loop.

for vs while

- Problem: You have had your **DNA** sequenced and each of your chromosomes is represented by a string of nucleotides: adenine (A), thymine (T), guanine (G), and cytosine (C).
- **chrome_4 = ATGGGCAA**
- Create a function to count the number of occurrences of a nucleotides.

```
my_func(chrome_4, 'A')  
>>> 3
```

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Click Link:
2. while vs for

while

```
i = 0
counter = 0
while i < len(chrome_4):
    if chrome_4[i] == 'A':
        counter += 1
    i += 1
```

for

```
counter = 0
for character in chrome_4:
    if character == 'A':
        counter += 1
```

■ Differences

while

```
i = 0
counter = 0
while i < len(chrome_4):
    if chrome_4[i] == 'A':
        counter += 1
    i += 1
```

for

```
counter = 0
for character in chrome_4:
    if character == 'A':
        counter += 1
```



■ Differences

- In the **while** loop, the loop variable (**i**) was the index of each character, while in the for loop the loop variable (**character**) is the value of each character.
- No indexing [**i**] required in the for loop.

while

```
i = 0
counter = 0
while i < len(chrome_4):
    if chrome_4[i] == 'A':
        counter += 1
    i += 1
```

for

```
counter = 0
for character in chrome_4:
    if character == 'A':
        counter += 1
```



■ Differences

- We do not have to worry about how long the string is (e.g., use `len()`) because the **for** loop will go through every character of the string exactly once.

while

```
i = 0
counter = 0
while i < len(chrome_4):
    if chrome_4[i] == 'A':
        counter += 1
    i += 1
```

for

```
counter = 0
for character in chrome_4:
    if character == 'A':
        counter += 1
```



■ Differences

- We do not have to worry about incrementing the loop variable (`i += 1`) as the `for` loop takes care of this.

while

```
i = 0
counter = 0
while i < len(chrome_4):
    if chrome_4[i] == 'A':
        counter += 1
    i += 1
```

6 lines

for

```
counter = 0
for character in chrome_4:
    if character == 'A':
        counter += 1
```

4 lines

- Differences
- The for loop is **MUCH** easier to read and therefore, desirable when writing code for large collaborative projects.
- #cleancode

for vs while

- You should use a **for** loop when you know how many times the loop should run.
- If you want the loop to break based on a condition (do this until....) you should use a **while** loop.

while & for Loops

- **for** loop or **while** loop?

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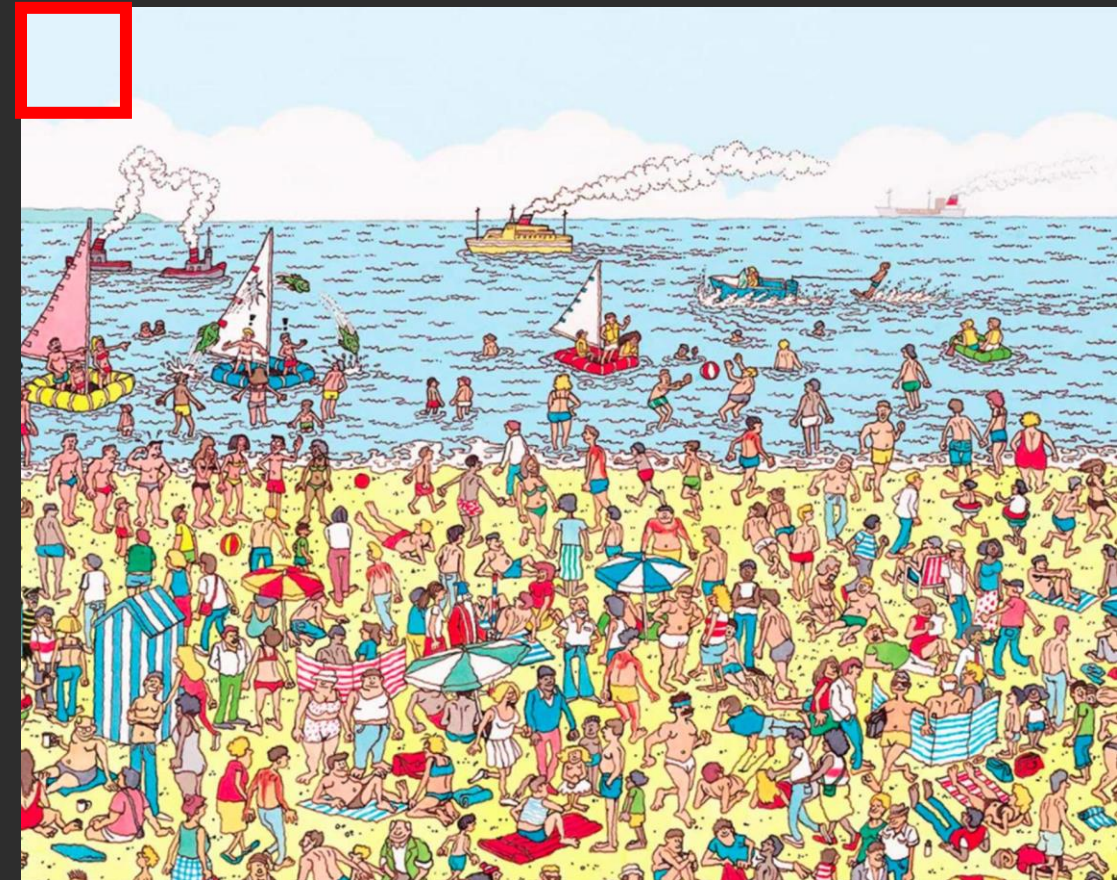
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while & for Loops

- for loop or while loop?



Breakout Session 1

Vowels: a, e, i, o, u.

- Write a function that takes in a string and returns the number of vowels in the string. (use **for** loop)
- Test 1
 - `count_vowels('Happy Anniversary!')`
 - 5
- Test 2
 - `count_vowels('xyz')`
 - 0

Open your notebook

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3. Breakout Session 1

Breakout Session 2

- Write a function to return the unique separators in a string of integer codes. (use **for** loop)
- The string only contains integers and separators.
- Test 1
 - `find_seperators('23,613-23;2:45')`
 - `',';-;:'`
- Test 2
 - `find_seperators('613-555-3224')`
 - `'_'`

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4. Breakout Session 2

Lecture Recap

Practice!

- `for` loops.
- Looping over strings.
- When to use a `for` loop over a `while` loop.

APS106

for loops.

Week 6 | Lecture 1 (6.1)

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