more for loops.

Week 6 | Lecture 2 (6.2)

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

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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.

```python
name = 'Sebastian'

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

```python
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.

```python
name = 'Sebastian'

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

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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.

```python
name = 'Sebastian'

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

for loops

```python
name = 'Sebastian'

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

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

Indent

Breakout Session 1

- We want to do some analysis of Dean Yip's Tweets.

- Before we can do this, we'll need to make the tweet all lower case and replace all the punctuations with white space.

- 'impact... Exciting' → 'impact   exciting'

Chris Yip @UofTEngDean · Oct 23
Replying to @UofTEngDean
great to hear from Prof. Bussman, Chair of @uoftmie about all the stuff that MechE do …. - amazing breadth of impact… exciting stuff across so many domains

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Click Link:
1. Breakout Session 1

Today's Content

- Looping through indices with a for loop.
- Nested for loops.

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Looping Through Indices

- Last lecture we saw that we can use while loops to loop over the indices of a string.

- Then we saw that a for-loop requires less code but it iterates over the values, not the indices.

```
while
i = 0
while i < len(chrome_4):
    print(i, chrome_4[i])
    i += 1
```

```
for
for character in chrome_4:
    print(character)
```

Looping Through Indices

- Can we use a for loop to loop over indices?

```
while
i = 0
while i < len(chrome_4):
    print(i, chrome_4[i])
    i += 1
```

```
for
for character in chrome_4:
    print(character)
```

Looping on a `range()`

- Python has a built-in function called `range()` that can be used to generate a sequence of numbers. The general syntax of range is as follows:

`range(start, stop, step)`

- Similar to the string slicing syntax:
  - The stop value is not included in the sequence of numbers generated.
  - Can omit start and step which will result in default values being used. `range(n)` → `range(0, n, 1)`

Looping on a `range()`

- `range()` is typically used in a for loop to iterate over a sequence of numbers.
- `range()` is an iterable.

This thing has to be an iterable.

```python
for i in range(5):
    print(i)
```

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Click Link:
2. Using range()

Example 1

- Add up all the even numbers between 1 and 100 using a `for` loop and `range()`.

- 2+4+.....+96+98+100

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Click Link:
3. Example 1

Breakout Session 2

- Write a function that returns the number of times that a character and the next character are the same.
- If you have a bug in a loop, with probability ~1 its an off-by-one index error.

```
count_adjacent_repeats('abccdeffggh')

>>> 3
```

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4. Breakout Session 2

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Nested for Loops

- The bodies of loops can contain any statement, including other loops!
- When this occurs, it is known as a nested loop.

```
for item in iterable:
    do something.


for i in range(10, 13):
    for j in range(1, 5):
        print(i, j)
```

```
Output
10, 1
10, 2
10, 3
…
```

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Nested for Loops

- The bodies of loops can contain any statement, including other loops!

- When this occurs, it is known as a nested loop.

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5. Nested for Loops

Turtles

- Turtle is a pre-installed Python library that enables users to create pictures and shapes by providing them with a virtual canvas.
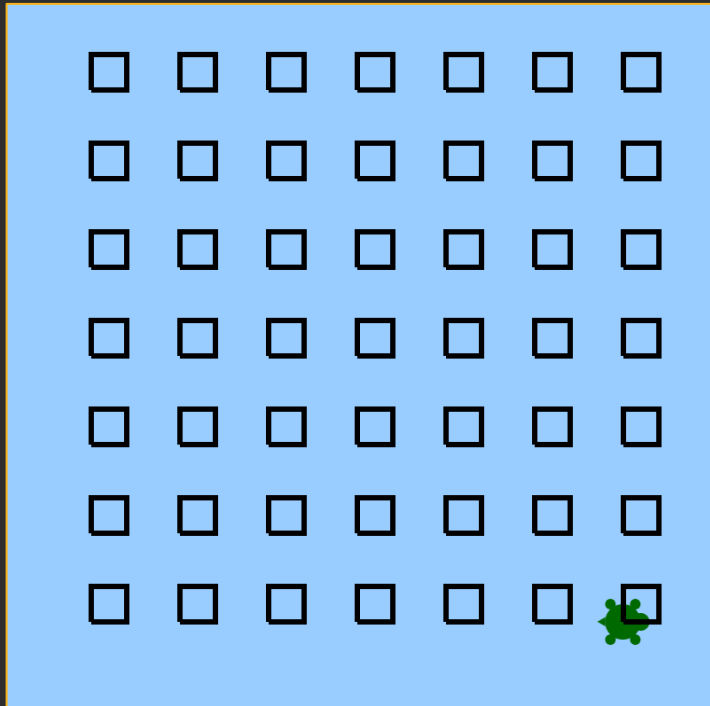
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Click Link:
6. Turtles

Draw A Grid

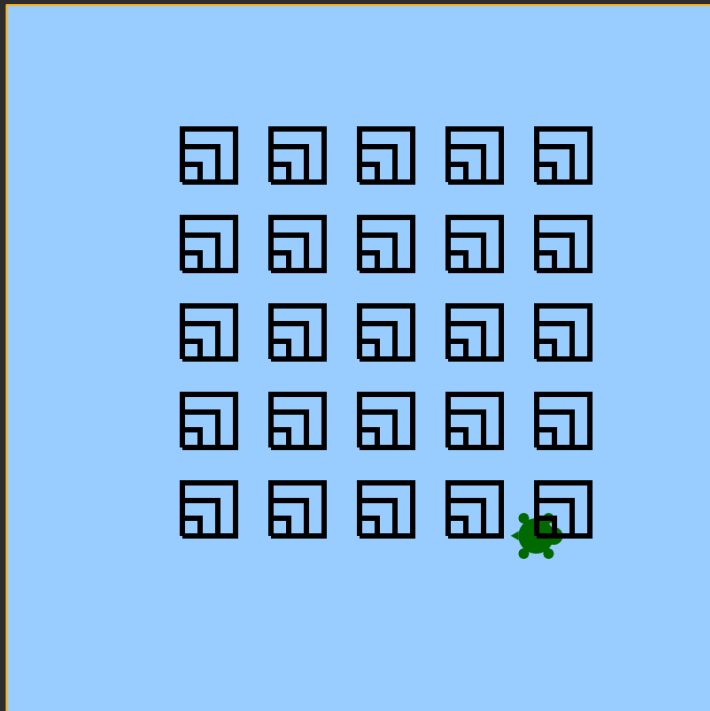- Use Turtle and nested for loops to draw a grid.
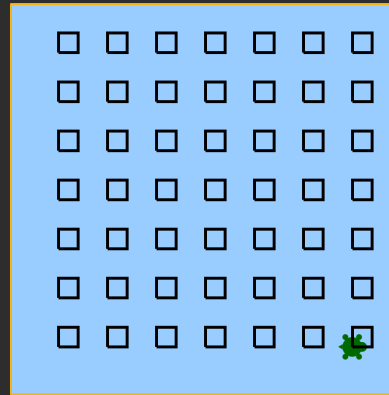

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7. Grid

Breakout Session 3

- Use Turtle and nested for loops to draw the pattern below.

We just finished this.

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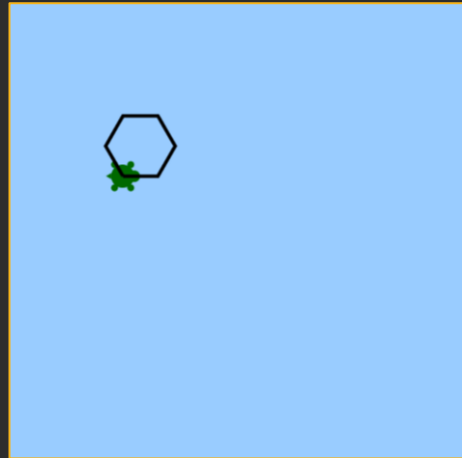**Click Link:**
4. Breakout Session 3

Lecture Recap

- The general form of a for loops.

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

- Iterable types have indices and items.
- For loops always iterate over the items in the iterable variable.
- Using range(start, end, step) we can keep track of where we are in a sequence (i.e. index).

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Advanced Turtles

- Create a function that draws a polygon at (x, y).

```
draw_polygon(x, y,
             num_sides,
             side_length)
```

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8. Advanced Turtles

more for loops.

Week 6 | Lecture 2 (6.2)