

# Data Structures and Programmatic Thinking

## Session 6

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You have been invited to **Codecademy**. Please follow the link in your email and create an account. There will be some sessions in which you'll be required to get something done in Codecademy, but for now, explore and see if there's any course that catches your eye.

# Plan for today

- review last day exercises

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- iteration

# Last session exercises

- 1 Create a function `weekly_commute_time` that asks the user their daily commute time and returns their weekly time spent commuting.
- 2 What do the following expressions return?
  - `True` or `11 > 34`
  - `False` and `(1 == 1)`
  - `(77 // 11) > 6` and `False`
- 3 Create a function `im_in_love` that takes a weekday number (from monday to friday), and returns how that weekday is (according to The Cure!):

I don't care if Monday's blue  
Tuesday's grey and Wednesday too  
Thursday I don't care about you  
It's Friday, I'm in love

# Mutability

Mutability is a feature of variables in most programming languages. It means that variables can be updated to newer values.

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x = x * 3

print(x)
```



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## Demo

Let's refresh how we can change the value of a variable in spyder.

# Iteration

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- 3 If condition is true, execute body. Then go to step 1.

# While

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while <condition>:  
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## How does it work?

- 1 Evaluate the condition
- 2 If the condition is False, exit while and go to next statement
- 3 If condition is true, execute body. Then go to step 1.

## Demo

Let's see how does the **while** loop work. Let's create a function that prints the numbers 1 to 50 (using iteration)



# Practice

## exercise

Create a function `pyramid` that receives an integer `n` as parameter and prints `n` lines of the following pattern:

```
*  
**  
***  
****  
*****
```

# Lists

Lists are sequences of values

# Constructing Lists

We construct lists with the brackets `[]` syntax. We surround everything that we want to include in the list with **square brackets** and separate elements with **commas**:

```
[1, 2, 3, 4, 5]  
["hello", "dolly"]  
[]  
[1, "hello", 2, "dolly", 3]
```

# Constructing Lists

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[1, 2, 3, 4, 5]  
["hello", "dolly"]  
[]  
[1, "hello", 2, "dolly", 3]
```

## Demo

Let's create some lists and see the type of those values.

# List length

We can get the length of a list using the **len** function:

```
names = ["Pepe", "Antonio"]  
print(len(names)) # will print 2
```

# Accessing list elements

We use **square brackets** to access elements by their **index**.

## Indices

**indices** in lists start by **0**, not 1.

```
words = ["hello", "dolly"]  
words[0]  
# "hello"  
words[1]  
# "dolly"
```

# Accessing list elements

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## Indices

**indices** in lists start by **0**, not 1.

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words = ["hello", "dolly"]  
words[0]  
# "hello"  
words[1]  
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```

## Demo

# Practice

## Exercise

Create a function that receives a list as a parameter and prints each element of the list individually.



# Operators on lists

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Demo

# Mutating lists

Lists are mutable values, and they provide functionality to add, delete, and update elements

# Updating elements in the list

To update an element inside the list, we use a syntax similar to the one for declaring variables, but using the brackets and the index we refer to.

```
numbers = [1,2,4]
numbers[2] = 3
print(numbers) # prints [1,2,3]
```

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To update an element inside the list, we use a syntax similar to the one for declaring variables, but using the brackets and the index we refer to.

```
numbers = [1,2,4]
numbers[2] = 3
print(numbers) # prints [1,2,3]
```

Demo

# Appending elements to the list

To add a new element to the end of the list we use the `append()` method on it.

```
numbers = [1,2,3]
numbers.append(4)
print(numbers) # prints [1,2,3,4]
```

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numbers = [1,2,3]
numbers.append(4)
print(numbers) # prints [1,2,3,4]
```

Demo

# Inserting elements in the list

There's an alternative way of adding new elements to the list, and it's using the `insert()` method on it:

```
words = ["hello", "my", "friends"]  
words.insert(2, "dear")  
print(words) # prints ["hello", "my", "dear", "friends"]
```

The difference between this and `append` is that with `insert` we can choose where to put it by using the target index



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print(words) # prints ["hello", "my", "dear", "friends"]
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The difference between this and `append` is that with `insert` we can choose where to put it by using the target index

Demo

# Removing elements from the list

In order to remove an element from a list, we should use the `.pop()` method, and pass the index of the element we want to remove

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words = ["hello", "my", "friend"]  
words.pop(1)  
print(words)
```

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words = ["hello", "my", "friend"]  
words.pop(1)  
print(words)
```

Demo

# For loops

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In each iteration, we will have a new value for the `iteration_variable`.

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Demo

## Exercise

create a function named **to\_string** that receives a list and returns a string with all elements of the list concatenated. Don't use the `join` function.

# Recap



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Use **lists** to store collections of values

Use mutation operations on list to append, remove, or update elements in the list

Use for loops to iterate over elements in the list

# Exercises

- Create a function that returns a list of numbers from 0 to 500
- Create a function that takes a list of numbers (you can use the one you created in the previous exercise) and returns the sum of all of them
- Investigate the `range()` function. After you've used it, create a function that receives a number as parameter and prints all numbers from it to zero (using a for loop).
- Create a function that takes a list of numbers and returns the maximum value among them
- Create a function that takes a list of numbers and returns the minimum value among them

(cont)

# Exercises (Cont)

- Create a function that prints the numbers 1 to 50 (using iteration)
- Create a program that prints multiplication tables from 1 to 10
- Create a function `inverted_pyramid` that writes the pyramid of stars in an inverted fashion.

```
*****  
****  
***  
**  
*
```

(cont)

# Exercises (Cont)

- Create a function `multiply` that takes two integers (`a` and `b`, for example) and returns `a` times `b`. Do not use the `*` operator.
- Create a function `exponentiate` that takes two arguments `base` and `exponent` and raises `base` to the `exponent` power. Do not use the `**` operator.

# Recommended literature

<https://www.py4e.com/html3/05-iterations>

<https://www.py4e.com/lessons/lists>