Week 2: Data Structures and Loops

Session 3: Lists and For Loops

Python Lists

A list is the simpliest data structure and it allows you to store a sequence of arbitrary objects while keeping track of their order.

```
[1]: # product sales in successive weeks
     sales=[10,25,5,15]

[2]: sales[0]
```

```
10
```

```
[3]: sales[1]
```

```
25
```

```
[4]: len(sales)
```

```
4
```

```
[5]: sales.append(20)
     sales
```

```
[10, 25, 5, 15, 20]
```

```
[6]: sales+[5,10]
```

```
[10, 25, 5, 15, 20, 5, 10]
```

```
[7]: sales
```

```
[10, 25, 5, 15, 20]
```

```
[8]: max(sales)
```

```
25
```

```
[9]: min(sales)
```

```
5
```

```
[10]: sum(sales)
```

```
75
```

```
[11]: sales[1:3]
```

```
[25, 5]
```

```
[12]: sales[:2]
```

```
[10, 25]
```

```
[13]: sales[-1]
```

```
20
```

```
[14]: 25 in sales
```

```
True
```

```
[15]: 25 not in sales
```

```
False
```

```
[16]: data=[[10,7.5],[25,5.5],[5,10],[15,7]]
```

```
[17]: data[0]
```

```
[10, 7.5]
```

```
[18]: data[0][1]
```

```
7.5
```

Exercise 2.1 Practicing List Syntax

Download the Jupyter notebook attached to the Blackboard link for this exercise and submit it at the same link. The notebook contains the following questions.

a) Create an empty list called "l".

b) Append each of the following objects to the list: `30`, `4.0`, `[3,4]`, `"Hello"`. The final value of the list should be as below.

```
[21]: # Value of l after running your code for parts a) and b) in order
      l
```

```
[30, 4.0, [3, 4], 'Hello']
```

c) Obtain the type of each element of the list.

d) Obtain a slice of the list from `30` to `4.0`.

e) Obtain the third element `[3,4]` in two different ways, using positive and negative indexing respectively.

f) Find the length of the third element (which is a list as well).

g) Check if the integer `4` is in the list. Do the same for the string `'4'`.

For Loops

For loops are used to iterate through a given collection of items in order.

```
[32]: for i in [5,4,3,2,1]:
          print('Count down:',i)
      print('Take off!')
```

```
Count down: 5
Count down: 4
Count down: 3
Count down: 2
Count down: 1
Take off!
```

```
[33]: for name in ['Alice','Bob','Charles']:
          print(f'Hi {name}!')
```

```
Hi Alice!
Hi Bob!
Hi Charles!
```

Example: Automating emails

```
[34]: data=[]
      data.append(['Alice','PhD'])
      data.append(['Bob','MSBA'])
      data.append(['Charles','MSBA'])
      data
```

```
[['Alice', 'PhD'], ['Bob', 'MSBA'], ['Charles', 'MSBA']]
```

```
[35]: for element in data:
          name,program=element
          email=f'''Dear {name},
      Congratulations! You have been accepted into the {program} Program at USC for Fall 2021
      You will receive more details in a packet soon. Hope to see you soon!
      USC Admissions
          '''
          print(email)
```

```
Dear Alice,
Congratulations! You have been accepted into the PhD Program at USC for Fall 2021.
You will receive more details in a packet soon. Hope to see you soon!
USC Admissions

Dear Bob,
Congratulations! You have been accepted into the MSBA Program at USC for Fall 2021.
You will receive more details in a packet soon. Hope to see you soon!
USC Admissions

Dear Charles,
Congratulations! You have been accepted into the MSBA Program at USC for Fall 2021.
You will receive more details in a packet soon. Hope to see you soon!
USC Admissions
```

Exercise 2.2. Practicing For Loops

Download the Jupyter notebook attached to the Blackboard link for this exercise and submit it at the same link. The notebook contains the following questions.

a) Write a for loop to print the multiplication table for multiplying by 2, as in the sample output below.

```
1 x 2 = 2
2 x 2 = 4
3 x 2 = 6
4 x 2 = 8
5 x 2 = 10
6 x 2 = 12
7 x 2 = 14
8 x 2 = 16
9 x 2 = 18
```

b) Write a for loop which takes in the list of names `['Alice','Bob','Charles']`, and print the number of characters in each name, as below.

Hint: you can use the `len` function to find the length of a string, as in

```
len('Alice')
```

```
The name Alice has length 5.
The name Bob has length 3.
The name Charles has length 7.
```

Using Range with For Loops

```
[38]: list(range(5,0,-1))
```

```
[5, 4, 3, 2, 1]
```

```
[39]: for i in range(5,0,-1):
          print('Count down:',i)
      print('Take off!')
```

```
Count down: 5
Count down: 4
Count down: 3
Count down: 2
Count down: 1
Take off!
```

```
[40]: list(range(0,5))
```

```
[0, 1, 2, 3, 4]
```

```
[41]: list(range(5))
```

```
[0, 1, 2, 3, 4]
```

```
[42]: for i in range(5):
          print('Repeating five times.')
```

```
Repeating five times.
Repeating five times.
Repeating five times.
Repeating five times.
Repeating five times.
```

```
[43]: # Listing the even numbers from 0 to 10.
      for i in range(0,11,2):
          print(i,end=' ')
```

```
0 2 4 6 8 10
```

Exercise 2.3. Practicing Range and For Loops

Download the Jupyter notebook attached to the Blackboard link for this exercise and submit it at the same link. The notebook contains the following questions.

a) Write one line of code using `range` which generates a `list` object containing odd numbers from 1 to 29 (inclusive).

b) Print a line that lists the even numbers from 10 to 0 backward, as below.

```
10 8 6 4 2 0
```

c) Write a function `squares` with one input parameter `n` (assumed to be a positive integer). The function should print the squares of the first `n` positive integers, as shown below.

```
[47]: # Test code 1
      squares(3)
```

```
1 x 1 = 1
2 x 2 = 4
3 x 3 = 9
```

```
[48]: # Test code 2
      squares(5)
```

```
1 x 1 = 1
2 x 2 = 4
3 x 3 = 9
4 x 4 = 16
5 x 5 = 25
```