

Python Programming

Recursive Functions

Homework 1

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Teaching, Training and Coaching since more than a decade!

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Problem #1: Length of $3n+1$

- Implement $3n+1$ function to compute the length of the sequence
- **def** length_3n_plus_1(n):
- E.g. length_3n_plus_1(6) \Rightarrow 9

Problem #2: Power function

- `def my_pow(value, p = 2):`
- Return value * value * value p times
- E.g. `my_pow(7, 3) = 7 * 7 * 7 = 343`
- Note: if `p = 0`, answer is 1
- P is positive integer

```
if __name__ == '__main__':  
    print(my_pow(7))      # 49  
    print(my_pow(7, 0))   # 1  
    print(my_pow(7, 3))   # 343
```

Problem #3: List sum

- Given a list of 0 or more numbers, find the sum among them

```
12
13 ► if __name__ == '__main__':
14     print(list_sum([]))           # 0
15     print(list_sum([5]))         # 5
16     print(list_sum([5, 7]))      # 12
```

Problem #4: List maximum

- Given a list of 1 or more numbers, find the maximum among them

```
3
4  def list_max(lst):...
17
18
19  ▶ if __name__ == '__main__':
20      print(list_max([5])) ... # 5
21      print(list_max([5, 7])) ... # 7
22  🏠💡 print(list_max(['most', 'saad', 'ibrahim'])) # saad
```

Problem #5: List average

- Given a list of 1 or more numbers, find the **average** among them

```
if __name__ == '__main__':  
    print(list_avg([5]))          # 5  
    print(list_avg([5, 7]))      # 6.0  
    print(list_avg([1, 2, 3, 4])) # 2.5
```

Problem #6: List Increment v1

- Given a list of numbers, we would like to increment each element based on its position and the list length as following
 - Assume list has length N
 - Then first element is increased with N, the second with N-1, and so on till last with 1
 - Develop a function that returns a new list with the requested increment

```
if __name__ == '__main__':  
    lst = [1, 8, 2, 10, 3]  
  
    print(list_increment(lst)) # [6, 12, 5, 12, 4]
```

Problem #7: List Accumulation v1

- Given a list of numbers, accumulate it
- E.g. list: 1 2 3 4 5 6 \Rightarrow 1, 3, 6, 10, 15, 21
 - 1+2, 1+2+3, 1+2+3+4, 1+2+3+4+5, 1+2+3+4+5+6

```
if __name__ == '__main__':  
    lst = [1, 8, 2, 10, 3]  
  
    print(list_accumulate(lst)) # [1, 9, 11, 21, 24]
```


“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”