

San José State University
Computer Science Department
CS152, Programming Paradigms, Springs 2022

Homework #3

Objective:

This homework's objective is to practice declarative programming in Python programming language.

Details:

Solutions to all exercises for this homework assignment should be implemented in Python. Submit solution to each exercise in a separate .py file. Make sure to include the following comments into each .py file (replace with your information):

```
# CS152 Spring 2022
# Student name
# SJSU student ID
# Homework assignment 3
# Exercise X
```

Name each .py file with the exercise number. For example, exercise1.py, exercise2.py, etc.

Exercise 1:

Using Python list comprehension, implement list conversion from one numeric list to another list, which only contains those elements from the first list that are divided by 3 without remainder.

Example of your code execution:

```
list1 = range(30)
list2 = [your code goes here]
print(list2)
```

Expected output:

```
[0, 3, 6, 9, 12, 15, 18, 21, 24, 27]
```

Exercise 2:

Using Python list comprehension, implement computing an intersection between two lists and save it in a third list.

Homework # 3

Example of your code execution:

```
list1 = range(20)
list2 = range(15, 30, 1)
list3 = [your code goes here]
print(list3)
```

Expected output:

```
[15, 16, 17, 18, 19]
```

Exercise 3:

Using Python list comprehension, implement processing of the following text:

*According to statistics, there are more trees on Earth than there are stars in the Milky Way.
Today, there are around 3 trillion trees and 400 billion stars.*

You should compute a list that contains only words that are numeric values in the above text. Feel free to implement any helper functions for this exercise. At the end print the resulting list as follows:

```
print(result)
```

The expected output is:

```
['3', '400']
```

Exercise 4:

Use a **lambda function** for this exercise. Utilize *map()* Python function to implement a mapping for a list of integers to produce a new list in which each element is the result of the following functions for each corresponding element in the original list:

$$y = x^4 - 4x^3 + 6x^2 - 4x + 1$$

Example of your code execution:

```
orig_list = range(10)
new_list = list( map( mapping of the original list to the function above ) )
print(new_list)
```

Exercise 5:

In this exercise let's practice closures in Python. Implement an outer function named ***make_multiplier(factor)***, where factor is the factor by which to multiply a given value. The inner function should return a value multiplied by that factor.

Homework # 3

Part1:

For part 1, simply create closures named *doubler* and *trippler* create multiplier factories by 2 and 3 correspondingly. Print the output of the *doubler* and *trippler* variables using value 3.

Example of your code execution:

```
doubler = make_multiplier(2)
trippler = make_multiplier(3)
print(doubler(3))
print(trippler(3))
```

The expected output is:

```
6
9
```

Part2:

For part 2, you will work with your implementation of *make_multiplier()* from part 1. Now use list comprehension to create a list of functions that multiply some value by a given factor. Simply use *range(1,11,1)* to create a list of factors. Your list of functions will contain functions as its elements, each function uses different factor to multiply a given value. Then use another list comprehension line of code to print values returned by these functions for values 3, 4, 5, and 6. In other words, the result of using the list of functions on each of these values should be another list.

Example of your code execution:

```
multiplier_list = [ your code goes here ]
result3 = [ your code goes here ]
result4 = [ your code goes here ]
result5 = [ your code goes here ]
result6 = [ your code goes here ]
print(result3)
print(result4)
print(result5)
print(result6)
```

The expected output of using multiplier_list to make a list of results :

```
[3, 6, 9, 12, 15, 18, 21, 24, 27, 30]
[4, 8, 12, 16, 20, 24, 28, 32, 36, 40]
[5, 10, 15, 20, 25, 30, 35, 40, 45, 50]
[6, 12, 18, 24, 30, 36, 42, 48, 54, 60]
```

Submission:

Compress all the homework .py files into a single compressed file named “Assignment3”, with the appropriate file extension. Make sure submit by 11:59pm on the due date listed in Canvas. Submit your solution via Canvas.

If you have any questions, message me or the grader or both:

Yulia.Newton@sjsu.edu

madhujitaranjit.ambaskar@sjsu.edu

Grading:

I will return the grades as fast as we can grade this homework. Normally it should not take more than a few weeks.

A total of 25 points are possible for this homework assignment.