Assignment 5 Solution

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Question 1

Display the given pattern by using python script?

In [38]:
```
for i in range (7,0,-1):
    pattern = ""
    for j in range (1,i+1):
        pattern += str(j)
    print(pattern)
```

```
1234567
123456
12345
1234
123
12
1
```

Question 2

Write python script to print the total number of same elements of two lists?

In [46]:
```
# Define Two Lists
list1 = [6,3,1,8,7]
list2 = [2,5,6,0,3]

#convert list into set
set1 = set(list1)
set2 = set(list2)

#find the intersection of two sets
same_elements = set1.intersection(set2)

#print the Result
print(f"The total number of same elements are: {len(same_elements)} {same_elements}")
```

```
The total number of same elements are: 2 {3, 6}
```

Question 3

Implement a simple calculator program that performs arithmetic operations based on user input

Note: If user input addition or + then it performs addition operation, same as it is for other operations

In [68]:
```
print("simple calculator")

# get user input for operation choice
choice = input("Enter the Operation you want to perform")

if choice in ['+','-','*','/','addition','subraction','multiplication','division']:
    #get user input for operands
    num1 = float(input("Enter the first num: "))
    num2 = float(input("Enter the second num: "))

    #perform selected operation and display result
    if choice == '+' or choice == 'addition':
        result = num1 + num2
        print('Result: ', result)

    elif choice == '-' or choice == 'subtraction':
        result = num1 - num2
        print("Result: ", result)

    elif choice == '*' or choice == 'multiplication':
        result = num1 * num2
        print("Result: ", result)


    elif choice == '/' or choice == 'division':
```

```
        if num2 == 0:
            print("Error: Division by zero")
        else:
            result = num1 / num2
            print("Result ", result)
else:
    print("please choose correct operation")
```

```
simple calculator
Result:  36.0
```

Question 4

Write a python script that input a text statement from the user and check how many times a particular character is repeated in the text?

In [100…

```
# Input a text statement from the user
text = input("Enter a text statement: ")

# input the characrter to count
char_to_count = input("Enter the character to count: ")

# count how many times particular character repeat
count = text.count(char_to_count)

#display the result
print(f"The Character {char_to_count} is repeated {count} times in the text statement")
```

```
The Character o is repeated 2 times in the text statement
```

Question 5

Function (positional argument & keyword argument):

a) Write a function that calculates the area of a rectangle given its length and width as positional arguments.

In [93]:

```
# This below func takes two positional arguments length and width
def calculate_rectangle_area(length,width):
    area = length * width
    return area

print(f"Area of the Rectangle: {calculate_rectangle_area(6,5)}")
```

```
Area of the Rectangle: 30
```

b) Create a function that prints a person's details (name, age, address) using keyword arguments.

In [94]:

```
# this below func takes three keyword arguments: name, age, and address
def print_person_details(name, age, address):
    print("Name: ",name)
    print("Age: ",age)
    print("Address: ",address)

print_person_details(name='yameen',age='23',address='Multan, Pakistan')
```

```
Name:  yameen
Age:  23
Address:  Multan, Pakistan
```

Question 6

Lambda Function

a) Implement a program that uses a lambda function to find the square of a given number.

In [99]:

```
# define a lambda function to find the square of the number
square = lambda x: x**2

# Input the number from the user
number = float(input("Enter a number: "))

# calculate the square using the lambda function
result = square(number)

# display result
print(f"The square of {number} is {result}")
```

```
The square of 5.5 is 30.25
```

b) Write a program that sorts a list of strings based on the length of each string using a lambda function.

In [10]:
```
list_of_strings = ['yameen','rafay','saad']
# use a lambda function as the key parameter
sorted_list = sorted(list_of_strings, key = lambda x: len(x))
print(sorted_list)
```

```
['saad', 'rafay', 'yameen']
```

Question 7

Filter, Map, and Reduce

a) Create a program that takes a list of strings as input and performs the following operations:

In [62]:
```
input_strings = ['yameen','rafay','Shah','haseeb','ahmad','ali']
```

Use filter() and a lambda function to filter out strings with a length less than 5.

In [63]:
```
filtered_strings = filter(lambda x: len(x) < 5,input_strings)
print("Strings with a length less than 5: ")
for string in filtered_strings:
    print(string)
```

```
Strings with a length less than 5:
Shah
ali
```

Use map() and a lambda function to convert the filtered strings to uppercase.

In [64]:
```
# Filter the strings first
filtered_strings = filter(lambda x: len(x) < 5, input_strings)

# Use map() and a lambda function to convert the filtered strings to uppercase
upper_case = map(lambda x: x.upper(), filtered_strings)

# Convert the map object to a list
upper_case = list(upper_case)

# Print the uppercase strings
print("Upper case Strings are:")
for string in upper_case:
    print(string)
```

```
Upper case Strings are:
SHAH
ALI
```

Use reduce() to concatenate the uppercase strings into a single string

In [65]:
```
from functools import reduce
concatenated_list = reduce (lambda x,y: x+y,upper_case)
print(concatenated_list)
```

```
SHAHALI
```

Write a program that reads a list of floating-point numbers from the user and uses map() to round each number to two decimal places. Then, use reduce() to find the sum of the rounded numbers

In [71]:
```
from functools import reduce

# Function to round floating-point numbers to two decimal places
def round_number(number):
    return round(number, 2)

# Function to find the sum of numbers
def sum_numbers(x, y):
    return x + y

# Read a list of floating-point numbers from the user
numbers = input("Enter a list of floating-point numbers separated by spaces: ").split()
print(numbers)

# Convert input strings to floating-point numbers
numbers = list(map(float, numbers))

# Use map() to round each number to two decimal places
rounded_numbers = list(map(round_number, numbers))
print(rounded_numbers)
```

```
# Use reduce() to find the sum of the rounded numbers
sum_of_rounded_numbers = reduce(sum_numbers, rounded_numbers)

# Print the sum of the rounded numbers
print("Sum of the rounded numbers:", sum_of_rounded_numbers)
```

```
['2.234', '2.342']
[2.23, 2.34]
Sum of the rounded numbers: 4.57
```

list of words, use filter() and map() to create a new list that contains the lengths of words that have more than three characters.

In [82]:
```
fruit_list = ['apple','cd','kiwi','orange','banana','mango','ap']
filtered_words = list(filter(lambda x: len(x)>3 , fruit_list))
print(filtered_words)
```

```
['apple', 'kiwi', 'orange', 'banana', 'mango']
```

Question 8

Cofee Machine

In [37]:
```
def get_user_input():
    """Prompts the user for their coffee choice and returns the choice in lowercase."""
    while True:
        print("COFEE MACHINE")
        choice = input("What would you like? (espresso/latte/cappuccino): ").lower()
        if choice in ("espresso", "latte", "cappuccino", "off", "report"):
            return choice
        else:
            print("Invalid choice. Please try again.")

def turn_off():
    """Turns off the machine by setting machine_on to False."""
    return False

def print_report(resources):
    """Prints a report on the current resource levels."""
    print("Water:", resources["water"], "ml")
    print("Milk:", resources["milk"], "ml")
    print("Coffee:", resources["coffee"], "g")
    print("Money:", resources["money"], "$")

def check_resources(resources, drink):
    """Checks if there are enough resources to make a drink."""
    MENU = {
        "espresso": {"water": 50, "milk": 0, "coffee": 18, "cost": 1.50},
        "latte": {"water": 200, "milk": 150, "coffee": 24, "cost": 2.50},
        "cappuccino": {"water": 250, "milk": 100, "coffee": 24, "cost": 3.00}
    }
    water_needed = MENU[drink]["water"]
    milk_needed = MENU[drink]["milk"] if drink != "espresso" else 0
    coffee_needed = MENU[drink]["coffee"]
    if resources["water"] < water_needed:
        print(f"Sorry, there is not enough water. ({resources['water']}ml available)")
        return False
    elif resources["milk"] < milk_needed:
        print(f"Sorry, there is not enough milk. ({resources['milk']}ml available)")
        return False
    elif resources["coffee"] < coffee_needed:
        print(f"Sorry, there is not enough coffee. ({resources['coffee']}g available)")
        return False
    return True

def process_coins():
    """Prompts the user for coins and calculates the total amount."""
    print("Please insert coins. (quarters = $0.25, dimes = $0.10, nickels = $0.05, pennies = $0.01)")
    quarters = int(input("How many quarters?: "))
    dimes = int(input("How many dimes?: "))
    nickels = int(input("How many nickels?: "))
    pennies = int(input("How many pennies?: "))
    total = 0.25 * quarters + 0.10 * dimes + 0.05 * nickels + 0.01 * pennies
    return total

def check_transaction(resources, drink, money_inserted):
    """Checks if the user has inserted enough money for the drink."""
    MENU = {
        "espresso": {"water": 50, "milk": 0, "coffee": 18, "cost": 1.50},
        "latte": {"water": 200, "milk": 150, "coffee": 24, "cost": 2.50},
        "cappuccino": {"water": 250, "milk": 100, "coffee": 24, "cost": 3.00}
    }
    drink_cost = MENU[drink]["cost"]
```

```python
    if money_inserted < drink_cost:
        print(f"Sorry, that's not enough money. Money refunded: ${money_inserted:.2f}")
        return False, 0  # Return False to indicate insufficient money and 0 change
    else:
        change = money_inserted - drink_cost
        resources["money"] += drink_cost  # Update machine's money with the drink's cost
        return True, change

def make_coffee(resources, drink):
    """Deducts resources from the machine after a successful transaction."""
    MENU = {
        "espresso": {"water": 50, "milk": 0, "coffee": 18, "cost": 1.50},
        "latte": {"water": 200, "milk": 150, "coffee": 24, "cost": 2.50},
        "cappuccino": {"water": 250, "milk": 100, "coffee": 24, "cost": 3.00}
    }
    water_needed = MENU[drink]["water"]
    milk_needed = MENU[drink]["milk"] if drink != "espresso" else 0
    coffee_needed = MENU[drink]["coffee"]
    resources["water"] -= water_needed
    resources["milk"] -= milk_needed
    resources["coffee"] -= coffee_needed
    print(f"Here is your {drink}. Enjoy!")

def give_change(change):
    """Offers change to the user."""
    print(f"Here is ${change:.2f} in change.")

def main():
    """The main function of the program."""
    resources = {
        "water": 300,
        "milk": 200,
        "coffee": 100,
        "money": 0
    }
    machine_on = True

    while machine_on:
        # Get user's choice
        choice = get_user_input()

        # Turn off the machine if the user chooses "off"
        if choice == "off":
            machine_on = turn_off()
            print("Turning off...")
            continue

        # Print report if the user chooses "report"
        elif choice == "report":
            print_report(resources)
            continue

        # Check if the machine has enough resources for the chosen drink
        if not check_resources(resources, choice):
            continue

        # Process coins and check transaction
        money_inserted = process_coins()
        success, change = check_transaction(resources, choice, money_inserted)
        if not success:
            continue  # Continue to the next iteration of the loop if transaction failed

        if change > 0:
            give_change(change)  # Offer change to the user if there's any

        # Make coffee
        make_coffee(resources, choice)

if __name__ == "__main__":
    main()
```

```
COFEE MACHINE
Water: 300 ml
Milk: 200 ml
Coffee: 100 g
Money: 0 $
COFEE MACHINE
Please insert coins. (quarters = $0.25, dimes = $0.10, nickels = $0.05, pennies = $0.01)
Here is $120.50 in change.
Here is your latte. Enjoy!
COFEE MACHINE
```

```
Water: 100 ml
Milk: 50 ml
Coffee: 76 g
Money: 2.5 $
COFEE MACHINE
Turning off...
```