

1. Variables

1. Create a variable named pi and store the value 22/7 in it. Now check the data type of this variable.

```
pi = 22 / 7
print("Value of pi:", pi)
print("Data type of pi:", type(pi))
```

```
Value of pi: 3.14
Data type of pi: <class 'float'>
```

2. Create a variable called for and assign it a value 4. See what happens and find out the reason behind the behavior that you see.

```
for = 4

for = 4
  ^
SyntaxError: invalid syntax
```

This error occurs because you're trying to assign a value to a reserved keyword 'for', which is not allowed in Python.

3. Store the principal amount, rate of interest, and time in different variables and then calculate the Simple Interest for 3 years. Formula: Simple Interest = $P \times R \times T / 100$

```
principal = 1000
rate_of_interest = 5
time = 3

simple_interest = (principal * rate_of_interest * time) / 100

print("Simple Interest: Rs", simple_interest)

Simple Interest: Rs 150.0
```

2. Numbers

1. Write a function that takes two arguments, 145 and 'o', and uses the `format` function to return a formatted string. Print the result. Try to identify the representation used.

```
def format_string(num, char):  
    formatted_str = "{}{}".format(num, char)  
    return formatted_str
```

```
result = format_string(145, 'o')  
print(result)
```

```
145o
```

2. In a village, there is a circular pond with a radius of 84 meters. Calculate the area of the pond using the formula: Circle Area = πr^2 . (Use the value 3.14 for π) Bonus Question: If there is exactly 1.4 liters of water in a square meter, what is the total amount of water in the pond? Print the answer without any decimal point in it. Hint: Circle Area = πr^2 Water in the pond = Pond Area Water per Square Meter

```
radius = 84  
pi = 3.14  
pond_area = pi * radius ** 2  
  
water = 1.4  
total_water = pond_area * water
```

```
print("Pond area:", pond_area, "square meters")  
print("Total amount of water in the pond:", int(total_water),  
      "liters")
```

```
Pond area: 22155.84 square meters  
Total amount of water in the pond: 31018 liters
```

3. If you cross a 490meterlong street in 7 minutes, calculate your speed in meters per second. Print the answer without any decimal point in it. Hint: Speed = Distance / Time

```
distance = 490
time = 7 * 60

speed = distance / time

print(int(speed), "meters per second")

1 meters per second
```

3. Lists

You have a list of superheroes representing the Justice League. justice_league = ["Superman", "Batman", "Wonder Woman", "Flash", "Aquaman", "Green Lantern"]

```
justice_league = ["Superman", "Batman", "Wonder Woman", "Flash",
                  "Aquaman", "Green Lantern"]
```

1. Calculate the number of members in the Justice League.

```
print("Number of members in the Justice League:", len(justice_league))

Number of members in the Justice League: 6
```

2. Batman recruited Batgirl and Nightwing as new members. Add them to your list.

```
justice_league.append("Batgirl")
justice_league.append("Nightwing")
print(justice_league)

['Superman', 'Batman', 'Wonder Woman', 'Flash', 'Aquaman', 'Green Lantern', 'Batgirl', 'Nightwing']
```

3. Wonder Woman is now the leader of the Justice League. Move her to the beginning of the list.

```
justice_league.insert(0,justice_league.pop(justice_league.index("Wonder Woman")))
print(justice_league)

['Wonder Woman', 'Superman', 'Batman', 'Flash', 'Aquaman', 'Green Lantern', 'Batgirl', 'Nightwing']
```

4. Aquaman and Flash are having conflicts, and you need to separate them. Choose either "Green Lantern" or "Superman" and move them in between Aquaman and Flash.

```
justice_league.insert(justice_league.index("Aquaman"),
justice_league.pop(justice_league.index("Green Lantern")))
print(justice_league)

['Wonder Woman', 'Superman', 'Batman', 'Flash', 'Green Lantern', 'Aquaman', 'Batgirl', 'Nightwing']
```

5. The Justice League faced a crisis, and Superman decided to assemble a new team. Replace the existing list with the following new members: "Cyborg", "Shazam", "Hawkgirl", "Martian Manhunter", "Green Arrow".

```
justice_league = ["Cyborg", "Shazam", "Hawkgirl", "Martian Manhunter", "Green Arrow"]
print(justice_league)

['Cyborg', 'Shazam', 'Hawkgirl', 'Martian Manhunter', 'Green Arrow']
```

6. Sort the Justice League alphabetically. The hero at the 0th index will become the new leader.

```
justice_league.sort()
print("Updated Justice League:", justice_league)
print("New leader of the Justice League:", justice_league[0])

Updated Justice League: ['Cyborg', 'Green Arrow', 'Hawkgirl', 'Martian Manhunter', 'Shazam']
New leader of the Justice League: Cyborg
```

4. If Condition

1. Write a program to determine the BMI Category based on user input.

Ask the user to:

Enter height in meters

Enter weight in kilograms

Calculate BMI using the formula: $BMI = \text{weight} / (\text{height})^2$

Use the following categories:

If BMI is 30 or greater, print "Obesity"

If BMI is between 25 and 29, print "Overweight"

If BMI is between 18.5 and 25, print "Normal"

If BMI is less than 18.5, print "Underweight"

Example:

Enter height in meters: 1.75

Enter weight in kilograms: 70

Output: "Normal"

```
height = float(input("Enter height in meters: "))
weight = float(input("Enter weight in kilograms: "))
bmi = weight / (height ** 2)
```

```
if bmi >= 30:
    category = "Obesity"
elif 25 <= bmi < 30:
    category = "Overweight"
elif 18.5 <= bmi < 25:
    category = "Normal"
else:
    category = "Underweight"

print("Output:", category)
```

```
Enter height in meters: 1.75
Enter weight in kilograms: 70
Output: Normal
```

2. Write a program to determine which country a city belongs to.

Given list of cities per country:

Australia = ["Sydney", "Melbourne", "Brisbane", "Perth"]

UAE = ["Dubai", "Abu Dhabi", "Sharjah", "Ajman"]

India = ["Mumbai", "Bangalore", "Chennai", "Delhi"]

Ask the user to enter a city name and print the corresponding country.

Example:

Enter a city name: "Abu Dhabi"

Output: "Abu Dhabi is in UAE"

```
Australia = ["Sydney", "Melbourne", "Brisbane", "Perth"]
UAE = ["Dubai", "Abu Dhabi", "Sharjah", "Ajman"]
India = ["Mumbai", "Bangalore", "Chennai", "Delhi"]
```

```
city = input("Enter a city name: ")
if city in Australia:
    country = "Australia"
elif city in UAE:
    country = "UAE"
elif city in India:
    country = "India"
else:
    country = "Unknown"

print("Output:", city, "is in", country)
```

```
Enter a city name: Mumbai
Mumbai is in India
```

3. Write a program to check if two cities belong to the same country.

Ask the user to enter two cities and print whether they belong to the same country or not.

Example:

Enter the first city: "Mumbai"

Enter the second city: "Chennai"

Output: "Both cities are in India"

```
Australia = ["Sydney", "Melbourne", "Brisbane", "Perth"]
UAE = ["Dubai", "Abu Dhabi", "Sharjah", "Ajman"]
India = ["Mumbai", "Bangalore", "Chennai", "Delhi"]
```

```
city1 = input("Enter the first city: ")
city2 = input("Enter the second city: ")
```

```
if city1 in Australia and city2 in Australia:
    country = "Australia"
elif city1 in UAE and city2 in UAE:
    country = "UAE"
elif city1 in India and city2 in India:
    country = "India"
else:
    country = None
```

```
if country:
    print("Both cities are in", country)
else:
    print("They don't belong to the same country")
```

```
Enter the first city: Mumbai
Enter the second city: Dubai
They don't belong to the same country
```

5. For Loop

1. Using a for loop, simulate rolling a six sided die multiple times (at least 20 times).

Count and print the following statistics:

How many times you rolled a 6

How many times you rolled a 1

How many times you rolled two 6s in a row

```
import random
num_6 = 0
num_1 = 0
num_two_6s_in_a_row = 0
prev_roll = None
num_rolls = 20
for _ in range(num_rolls):
```

```

# Roll the die
roll = random.randint(1, 6)

# Count the rolls of 6 and 1
if roll == 6:
    num_6 += 1
    if prev_roll == 6:
        num_two_6s_in_a_row += 1
elif roll == 1:
    num_1 += 1

prev_roll = roll

print("Number of times rolled a 6:", num_6)
print("Number of times rolled a 1:", num_1)
print("Number of times rolled two 6s in a row:", num_two_6s_in_a_row)

Number of times rolled a 6: 3
Number of times rolled a 1: 5
Number of times rolled two 6s in a row: 1

```

2. Imagine you are doing a workout routine, and you have to complete 100 jumping jacks.

Write a program that:

Asks you to perform 10 jumping jacks at a time.

After each set, it asks, "Are you tired?"

If you reply "yes" or "y," it should ask if you want to skip the remaining sets.

If you reply "yes" or "y," it should break and print, "You completed a total of jumping jacks."

For example, if you did only 30 jumping jacks and answered "yes," the program will break and print, "You completed a total of 30 jumping jacks."

If you reply "no" or "n," it should continue and display how many jumping jacks are remaining. After that, ask you again, "Are you tired?"

For example, if you answered "no," it should display that 70 jumping jacks are remaining and ask you again, "Are you tired?"

If you reply "no" or "n," it should continue and display how many jumping jacks are remaining. After that, ask you again, "Are you tired?"

For example, if you answered "no," it should display that 70 jumping jacks are remaining and ask you again, "Are you tired?"

If you complete all 100 jumping jacks, it should print, "Congratulations! You completed the workout," and stop the program

```
remaining_jumping_jacks = 100

while remaining_jumping_jacks > 0:
    # Perform 10 jumping jacks
    if remaining_jumping_jacks >= 10:
        completed_jacks = 10
        remaining_jumping_jacks -= 10
    else:
        completed_jacks = remaining_jumping_jacks
        remaining_jumping_jacks = 0

    print(f"Performed {completed_jacks} jumping jacks.")

    # Check if the user is tired
    tired = input("Are you tired? (yes/no): ").lower()
    if tired == "yes" or tired == "y":
        skip_remaining = input("Do you want to skip the remaining
sets? (yes/no): ").lower()
        if skip_remaining == "yes" or skip_remaining == "y":
            break
    else:
        print(f"{remaining_jumping_jacks} jumping jacks remaining.")

if remaining_jumping_jacks == 0:
    print("Congratulations! You completed the workout.")
else:
    print(f"You completed a total of {100 - remaining_jumping_jacks}
jumping jacks.")
```

```
Performed 10 jumping jacks.
Are you tired? (yes/no): no
90 jumping jacks remaining.
Performed 10 jumping jacks.
Are you tired? (yes/no): no
80 jumping jacks remaining.
Performed 10 jumping jacks.
Are you tired? (yes/no): yes
Do you want to skip the remaining sets? (yes/no): yes
You completed a total of 30 jumping jacks.
```