

Week - 2

Title : Mean and standard deviation.

Aim : write a program in python to print the mean and standard deviation of 5 scores input by the user.

Requirements : Python interpreter (python 3.8.2)

Theory :

1. Mean (Average) :

The mean is the average of all numbers.

Formula :

$$\text{Mean} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Example : If scores = 10, 20, 30, 40, 50

$$\text{Mean} = \frac{(10 + 20 + 30 + 40 + 50)}{5} = \frac{150}{5} = 30$$

2. Standard deviation (SD) :

The standard deviation tells us how spread out the values are from the mean.

Formula :

$$SD = \sqrt{\frac{\sum (x_i - \text{Mean})^2}{n}}$$

first, subtract the mean from each

number

Output :-

Enter score 1 : 10

Enter score 2 : 20

Enter score 3 : 30

Enter score 4 : 40

Enter score 5 : 50

Scores : [10.0, 20.0, 30.0, 40.0, 50.0]

Mean (Average) : 30.0

Standard Deviation : 14.142135623730951

number, square the difference, add them up, divide by total numbers, then take the square root.

Syntax / Code :

```
import numpy as np # for easy calculation  
# Take 5 scores from the user.
```

```
scores = []
```

```
for i in range(5):
```

```
    score = float(input("Enter score  
of " + str(i+1) + ":"))
```

```
scores.append(score)
```

~~# Calculate mean and standard deviation~~

~~# Deviation~~

```
mean = np.mean(scores)
```

```
std_dev = np.std(scores)
```

~~# Display the results.~~

```
print("In Scores", scores)
```

```
print("Mean (Average):", mean)
```

```
print("Standard deviation:", std-dev)
```

Ajay

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Title : Calculator for basic arithmetic operations.

Aim : write a program in python to create a calculator that can perform basic arithmetic operations.

Requirements : Python interpreter (python 3+)

Theory :

1. Calculator : It is a program that can take two numbers from the user and perform arithmetic operations like addition, subtraction, multiplication, and division.

2. Basic Arithmetic Operations :

• Addition (+) → Adds two numbers.

• Subtraction (-) → Subtracts one number from another

• Multiplication (*) → Multiplies two numbers

• Division (/) → Divides one number by another

Ananya

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3. Program Flow:

- (1) Ask the user to enter two numbers.
- (2) Ask the user to choose an operation.
(Add, Subtract, Multiply, Divide).
- (3) Perform the calculation.
- (4) Show the result.

Syntax / code :-

```
# Step 1 : Taking input from the user
num1 = float(input("Enter first number:"))
num2 = float(input("Enter second number:"))
```

Step 2 : show operation choices.

```
print("In Select operation:")
print(" 1. Addition (+)")
print(" 2. Subtraction (-)")
print(" 3. Multiplication (*)")
print(" 4. division (/)")
```

Step 3 : Take user choice

```
choice = input("Enter choice (1/2/3/4):")
```

Step 4 : Perform calculation based on
choice

```
if choice == "1":
    print("Result:", num1 + num2)
```

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Output :-

Enter first number : 40

Enter second number : 50

Select Operation:

1. Addition (+)
2. Subtraction (-)
3. Multiplication (*)
4. Division (/)

Enter st choice (1/2/3/4) : 1

Result : 90.0

```
elif choice == "2":  
    print ("Result:", num1 - num2)  
  
elif choice == "3":  
    print ("Result:", num1 * num2)  
  
elif choice == "4":  
    if num2 != 0 # Prevent divide by 0 error.  
        print ("Result:", num1 / num2)  
    else:  
        print ("Error: Division by zero is not allowed!")  
  
else:  
    print ("Invalid input! Please select 1, 2, 3, or 4.")
```

Teacher's Signature _____

Title : Temperature conversion ($^{\circ}\text{C} \leftrightarrow ^{\circ}\text{F}$)

Aim : Write a program in python to convert temperatures between Celsius and Fahrenheit.

~~Requirements :~~ python interpreter (python 3+).

Theory :

1. Temperature conversion : Temperature can be measured in different units, the most common being Celsius ($^{\circ}\text{C}$) and Fahrenheit ($^{\circ}\text{F}$), we often need to convert between them.

2. formulas :

- Celsius \rightarrow Fahrenheit

$$F = \left(\frac{9}{5} \times C \right) + 32$$

- Fahrenheit \rightarrow Celsius

$$C = \frac{5}{9} \times (F - 32)$$

These formulas will be used in python code.

Ajay

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3. Program flow:

1. Ask the user whether they want to convert from Celsius or Fahrenheit.

2. Take temperature input.

3. Apply correct formula.

4. Print the converted temperature.

Code / Syntax :

```
# Temperature conversion Program
print ("Temperature conversion")
print ("1. Celsius to Fahrenheit")
print ("2. Fahrenheit to Celsius")
```

Step 1 : User choice

```
choice = input("Enter your choice (1/2):")
```

Step 2 : Conversion based on choice

```
if choice == "1":
```

```
celsius = float(input("Enter temperature  
in Celsius:"))
```

$$\text{Fahrenheit} = (\text{celsius} \times \frac{9}{5}) + 32$$

```
print(f"\{celsius}\u00b0C is equal to  
\u00b0Fahrenheit")
```

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Output :-

Temperature Conversion

1. Celsius to Fahrenheit

2. Fahrenheit to Celsius

choice (1/2) : 2

Enter your choice in Fahrenheit : 30

Enter temperature in Celsius : 30

30.0 °F is equivalent to -1.111111111111112 °C



elif choice == "2":

Fahrenheit = float(input("Enter temperature in fahrenheit:"))

Celsius = (fahrenheit - 32) * 5/9

Print(f"\n{fahrenheit} °F is equal to
{Celsius} °C")

else:

print("Invalid choice! Please select 1 or 2.")

Mayya

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~~Step by Step~~
Title : Check input is even or odd

Aim : Write a program in Python to check whether an input is even or odd

~~Requirements~~ : Python Interpreter (python 3+)

Theory :

1. Even and Odd Numbers :

- Even number : A number divisible by 2 with no remainder

Example : 2, 4, 6, 10 --

- Odd number : A number that leaves remainder 1 when divided by 2.

Example : 1, 3, 5, 7 --

2. Module Operator (%) : In python the % operator gives the remainder of division

- If $\text{num} \% 2 == 0 \rightarrow$ number is even.
- Else \rightarrow number is odd.

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Output :-

Enter a number : 20

20 is an Even number

~~Syntax / code :-~~

Program to check whether a number
is even or odd.

Step 1: Input a number from the user
num = int(input("Enter a number:"))

Step 2: Check using modulo operator
if num%2 == 0:
 print(f"{num} is an Even number!")

else:

print(f"{num} is an odd number.")

AJAYA

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Title :- Checking leap year.

Aim:- ~~Write a program in Python to check whether an input is leap year or not.~~

Requirements: Python Interpreter (3+).

Theory:

1. Leap year Rules :

A year is a leap year if :-

1. It is divisible by 4,
2. But if it is divisible by 100, then it must also be divided by 400.

Example:-

- 2000 → divisible by 400 → leap year
- 1900 → divisible by 100 but not 400 → not leap
- 2024 → divisible by 4 not by 100 → leap year
- 2023 → not divisible by 4 → not leap year

Answer

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Output:

Enter a year : 2025

2025 is NOT a leap Year.

Code :

Program to check whether a year is
a leap year or not

Step 1 : Input a year from the user
year = int(input("Enter a year :"))

Step 2 : Apply leap year conditions
if (year % 400 == 0) or (year % 100 != 0
and year % 4 == 0):
 print(f"\{year} is a Leap year.")

else :

 print(f"\{year} is NOT a leap year.")

AJAYA

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Title : determination of type of number (+ve, -ve, 0)

Aim : write a python program that prompts the user to enter a number and determines whether it is positive, negative, or zero.

Requirement : Python interpreter (3+)

Theory :

In mathematics :

- A number is positive if it is greater than 0.
- A number is negative if it is less than 0.
- A number is zero if it is exactly equal to zero. (0).

we can check this in Python using if - elif - else conditions.

Code :

```
# Program to check whether a number  
is positive, negative, or zero.
```

Step 1 : Take input from the user.

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Output :-

Enter a number: 30

30.0 is a Positive number.

~~num = float (input ("Enter a number:"))~~

~~# Step 2 : check conditions~~

~~if num > 0:~~

~~print (f"\{num\} is a positive
 number.")~~

~~elif num < 0 :~~

~~print (f"\{num\} is a negative
 number .")~~

~~else :~~

~~print ("The number is zero.")~~

Ajay

Teacher's Signature

Title: Age group Determination

Aim: Write a program that prompts the user to enter their age and points the corresponding age group. The program should use the following age groups: 0 - 12 : Child ; 13 - 19 : Teenager ; 20 - 59 : Adult ; 60 and above : Senior Citizen.

Requirement : Python interpreter (3+)

Theory :

Age classification is commonly used to group people into categories:

- 0 - 12 → Child
- 13 - 19 → Teenager
- 20 - 59 → Adult
- 60 and above → Senior Citizen

Using Python's if- elif- else conditions.

Syntax / code:

Step 1 : Take age input from user

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Output :-

Enter your age : 40

You are an Adult.



age = int(input("Enter your age:"))

#step 2 : Apply conditions

if ~~0 <= age <= 12 :~~

 print ("You are a Child.")

elif ~~13 <= age <= 19 :~~

 print ("You are a teenager.")

elif ~~20 <= age <= 59 :~~

 print ("You are an Adult.")

elif ~~age >= 60 :~~

 print ("You are a senior citizen!")

~~else:~~

 print ("Invalid age entered. Age cannot be negative.")

ANJAYA

Teacher's Signature _____

Title :- Body Mass Index calculation

Aim:- Write a program that prompts the user to enter their weight (in kilograms) and height (in meters). The program should calculate the Body Mass Index (BMI) using the formula : $BMI = \text{weight} / (\text{height} * \text{height})$.

The program should then classify the BMI into one of the following categories:

BMI less than 18.5 - Underweight

BMI between 18.5 and 24.9 - Normal weight

BMI between 25 and 29.9 - Overweight

BMI 30 or greater - Obesity.

Requirement : Python interpreter (3+)

Theory: BMI is a value derived from the weight and height of a person.

Formula:

$$BMI = \frac{\text{Weight (kg)}}{\text{height (m)}^2}$$

ANAYA

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Based on the World Health Organisation (WHO) classification :

- $BMI < 18.5 \rightarrow$ Underweight
- $18.5 \leq BMI \leq 24.9 \rightarrow$ Normal weight
- $25 \leq BMI \leq 29.9 \rightarrow$ Overweight
- $BMI \geq 30 \rightarrow$ Obesity

Code :

Step 1 : Take input from user
 $weight = float(input("Enter your weight in kilograms :"))$

$height = float(input("Enter your height in meters :"))$

Step 2 : Calculate BMI
 $bmi = weight / (height * height)$

Step 3 : Display BMI value
~~print(f"Your BMI is : {bmi:.2f}")~~
 # Rounded to 2 decimal places

Step 4 : Classify BMI
~~if bmi < 18.5 :~~
 ~~print ("Category : Underweight")~~

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Output :-

Enter your weight in kilograms : 1500

Enter your height in meters : 10

Your BMI is : 15.00

Category : Underweight



```
if 18.5 <= bmi <= 24.9:  
    print ("Category : Normal weight")
```

```
elif 25 <= bmi <= 29.9:  
    print ("Category : Overweight")
```

~~else:~~

~~print ("Category : Obesity")~~

~~Q~~
~~66/09/25~~

Aranya

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