Assignment 2
Python Functions

MIS4001/5000

2025-07-06

1   Instruction

File to submit: YourFirstNameLastName.ipynb Due Date: 6/29/2025
You will write a few python functions for practice with the language. In part 1, all functions will use the INPUT function to get input data from the user and the PRINT function to display output to the user. All of the functions from part 1 and part 2 will appear in the same file, YourFirstNameLastName.ipynb. In your file, also include a comment at the top with your name, student ID, and GovState Email. After the comment, write each of the following functions. You must name each function exactly as specified in your document/comments, and your input and output must exactly match your comments.

2   Part 1 Simple Functions

Problem 1: Geometric Calculation

Your task is to choose ONE of the following geometric objects:

1. Cylinder

2. Cone

3. Sphere

For your chosen object, you must implement **ONE** Python function calculating surface area and volume. Please finish this one by following the requirements below:

1. Define each function clearly using "def".

2. Choose descriptive function names (e.g., calculate_cylinder_surface_area, get_cone_volume, sphere_area).

3. Each function must return values as required (the calculated area and volume).

4. Each function must take appropriate numerical parameters/arguments depending on your selection(e.g., radius, height).

5. Include a docstring at the beginning of each function explaining its purpose, parameters, and what it returns. You can refer to how we comment the function in the in-class programming project 1.

6. Add inline comments (#) to explain complex logic or significant steps within your code.

7. Use the math module for the value of pi (e.g., import math then math.pi).

8. After defining your functions, include a section in your script that demonstrates how to use them.

9. Print the calculated surface area and volume with clear labels for a few example inputs with 4 digits after the decimal place.

Problem 2 Distance Calculation

Your task is to implement all following distance metrics:

1. Euclidean Distance: Link to Euclidean Distance

2. Manhattan Distance: Link to Manhattan Distance

3. Minkowski Distance: Link to Minkowski Distance

For each distance metrics, you must implement **ONE** Python function calculating each distance. Please finish this one by following the requirements below:

1. Define each function clearly using "def".

2. Choose descriptive function names.

3. Each function must return values as required (the calculated distance).

4. Each function must take appropriate numerical parameters/arguments depending on the distance metrics(e.g., radius, height).

5. Include a docstring at the beginning of each function explaining its purpose, parameters, and what it returns. You can refer to how we comment the function in the in-class programming project 1.

6. Add inline comments (#) to explain complex logic or significant steps within your code.

7. Using existing the Python module/library will be assigned 0. However, you can use those modules and library to verify your solution.

8. After defining your functions, include a section in your script that demonstrates how to use them.

9. Print the calculated values with clear labels for a few example inputs with 4 digits after the decimal place.

3 Part 2 Challenging Functions

Problem 3

Scenario

Imagine you are a bank teller. One day, the automatic money counter is out of order, and you need to manually process customer deposits. Based on your skills, you typically count money by taking either one piece of paper money at a time or two pieces of paper money at a time from the deposit stack, regardless of the denomination (e.g., you might take one $5 bill, or two bills like a $10 and a $20).

You're interested in a fun challenge: If a customer deposits a total of n pieces of paper money into his account, how many distinct ways can you count out this entire amount using only your usual counting methods (taking 1 piece or 2 pieces at a time)?

Task

Write a Python function that takes a positive integer n (the total number of pieces of paper money in the deposit) as input and returns the total number of distinct ways you can count out these n pieces by taking either 1 piece or 2 pieces at a time.
Function Name: Please name your function as following

1. CountManually

Parameters: the customer is depositing n piece of paper money.

1. n

Returned Value: An integer value that represents the total methods of counting all money.

1. num_methods

Test Case:

1. Case 1: CountManually(1)=1

2. Case 2: CountManually(2)=2

3. Case 3: CountManually(3)=3

4. Case 4: CountManually(4)=5

5. Case 5: CountManually(10)=89

6. Case 6: CountManually(15)=1597

Requirement

Please finish this one by following the requirements below:

1. Define each function clearly using "def".

2. Each function must return values as required.

3. Each function must take appropriate numerical parameters/arguments depending on the distance metrics(e.g., radius, height).

4. Include a docstring at the beginning of each function explaining its purpose, parameters, and what it returns. You can refer to how we comment the function in the in-class programming project 1.

5. Add inline comments (#) to explain complex logic or significant steps within your code.

6. Using existing the Python module/library will be assigned 0. However, you can use those modules and library to verify your solution.

7. After defining your functions, include a section in your script that demonstrates how to use them.

8. Print the calculated values with clear labels for a few example inputs with 4 digits after the decimal place.

Note and Hint

Note: Many software development projects will have a document similar to this problem statement describing the programming requirement. The document should clearly outline the scenario, task(function name, parameters, and return values), and other requirements.
Hint: Consider how the number of ways to count n pieces relates to the number of ways to count n-1 pieces and n-2 pieces.