Introduction to Programming

Session 5: Functions (Abstraction, Decomposition and Recursion)

Name:

Batch:

Date:

Please answer all the questions with outputs (values or completed: yes/no) and return the sheet.

1. In the United States, a car's fuel efficiency is measured in miles per gallon. In the metric system that is followed in India, it is usually measured in kilometres per litre or litres per 100 kilometres.

1 Mile = 1.60934 Kilometres, 1 Gallon = 3.78541 Litres

An agency wants to market their car models in India.

a. **Provide a function called convert_mileage that takes miles per gallon and converts it into kilometres per litre.**
b. **Test that your functions returns the right values for 20 and 40 miles per gallon.**
c. **Given a US catalogue of cars with mileage, provide the corresponding figures for Indian market in similar format.**

Model	Fuel Economy (City/ Highway/ Combined)
2001 Pontiac Firebird	17 MPG/ 25 MPG/ 20 MPG
2014 Dodge Challenger	18 MPG/ 27 MPG/ 21 MPG
2015 Chevrolet Camaro	19 MPG/ 29 MPG/ 22 MPG

Source: https://www.carhp.com/news/most-fuel-efficient-muscle-cars-ever-made

Hint: Use dictionary for model, a tuple for fuel economy.
Display model and fuel economy using print and '\t' for separation.
Iterate through keys, compute values and display using fstrings in format.

2. The agency was satisfied with the provided feature in Q1, and asked for following additional functionalities

a. **Function called liters_needed_kml that takes distance in kilometres and gas mileage in metric system for a vehicle, then computes and returns the amount of gas needed in litres to travel that distance.**
b. **Check the litres needed for**
    i. **150km with 30km per litre mileage.**
    ii. **100km with 20km per litre mileage.**
c. **Provide same functionality for the US market that takes distance in miles and gas mileage in mpg, then computes and returns the amount of gas needed in gallons.**

3. Write a function called find_dups that takes a list of integers as its input argument and returns a set of those integers that occur two or more times in the list.

4. Create a calculator for geometric shapes: (square, rectangle, and circle), taking user inputs for parameters and calculate area and perimeter for these shapes. Write are and perimeter functions for each shape.

5. Using recursive functions, calculate:

i. **Factorial of number**
ii. **Sum of digits of a number**
iii. **Fibonacci series up to n terms**