Practice 1 – OOP

Note: Use cout and cin for input/ output. Secondly, solve each problem by creating small functions. Such that each function should perform specific task only:

Task 01: In a population, the birth rate is the percentage increase of the population due to births, and the death rate is the percentage decrease of the population due to deaths. Write a program that displays the size of a population for any number of years. The program should ask for the following data:

- The starting size of a population
- The annual birth rate
- The annual death rate
- The number of years to display

Write a function that calculates the size of the population for a year. The formula is $N \ = \ P \ + \ BP \ - \ DP$ where N is the new population size, P is the previous population size, B is the birth rate, and D is the death rate.

Input Validation: Do not accept numbers less than 2 for the starting size. Do not accept negative numbers for birth rate or death rate. Do not accept numbers less than 1 for the number of years.

Task 02: A painting company has determined that for every 110 square feet of wall space, one gallon of paint and eight hours of labor will be required. The company charges $25.00 per hour for labor. Write a modular program that allows the user to enter the number of rooms that are to be painted and the price of the paint per gallon. It should also ask for the square feet of wall space in each room. It should then display the following data:

- The number of gallons of paint required
- The hours of labor required
- The cost of the paint
- The labor charges
- The total cost of the paint job

Input validation: Do not accept a value less than 1 for the number of rooms. Do not accept a value less than $10.00 for the price of paint. Do not accept a negative value for square footage of wall space.

Task 03: Write a program that lets the user play the game of Rock, Paper, and Scissors against the computer. The program should work as follows:

1. When the program begins, a random number in the range of 1 through 3 is generated. If the number is 1, then the computer has chosen rock. If the number is 2, then the computer has chosen paper. If the number is 3, then the computer has chosen scissors. (Do not display the computer's choice yet.)
2. The user enters his or her choice of "rock", "paper", or "scissors" at the keyboard. (You can use a menu if you prefer.)
3. After the user choice, display the computer's choice
4. A winner is selected according to the following rules:
   a. If one player chooses rock and the other player chooses scissors, then rock wins. (The rock smashes the scissors.)
   b. If one player chooses scissors and the other player chooses paper, then scissors wins. (Scissors cuts paper.)
   c. If one player chooses paper and the other player chooses rock, then paper wins. (Paper wraps rock.)
   d. If both players make the same choice, repeat all steps starting from one to determine the winner.
5. After each game give choice to user to play again

Be sure to divide the program into functions that perform each major task.

Task 04: Write a program that calculates and displays the total travel expenses of a businessperson on a trip. The program should have functions that ask for and return the following:

- The total number of days spent on the trip
- The time of departure on the first day of the trip, and the time of arrival back home on the last day of the trip

- The amount of any round-trip airfare
- The amount of any car rentals
- In case of private vehicle, number of miles driven. Calculate the vehicle expense as $0.27 per mile driven
- Parking fees (The Company allows up to $6 per day. The employee must pay anything in excess of this.)
- If taxi is used anytime during the trip, the taxi fees (The Company allows up to $10 per day, for each day a taxi was used. The employee must pay anything in excess of this.)
- Conference or seminar registration fees
- Hotel expenses (The Company allows up to $90 per night for lodging. The employee must pay anything in excess of this.)
- The amount of each meal eaten. On the first day of the trip, employee can avail breakfast as an expense if the time of departure is before 7 a.m., Lunch is allowed if the time of departure is before 12 noon. Similarly, employee can avail dinner on the first day if the time of departure is before 6 p.m. On the last day of the trip, breakfast is allowed if the time of arrival is after 8 a.m., Lunch is allowed if the time of arrival is after 1 p.m., The employee can avail dinner on the last day if the time of arrival is after 7 p.m. The program should only ask for the amounts of allowable meals. (The company allows up to $9 for breakfast, $12 for lunch, and $16 for dinner. The employee must pay anything in excess of this.)

The program should calculate and display the total expenses incurred by the employee, the total allowable expenses for the trip, the excess amount (This amount must be reimbursed by the businessperson), if any, and the amount saved by the businessperson if the expenses were under the total allowed.

Input Validation: Do not accept negative numbers for any dollar amount or for miles driven in a private vehicle. Do not accept numbers less than 1 for the number of days. Only accept valid times for the time of departure and the time of arrival.