

Write the following seven programs using Function (Iteration and Recursion)

1. Print the reverse of a positive integer.
2. Check a positive integer is palindrome or not.
3. Find the LCM and HCF of two numbers.
4. Find out the prime factors of a number.
5. Generate fibonacci series.
6. Find the power of a positive integer.
7. Find the factorial of a number.

Write the following six programs using Function

1.

You have saved \$500 to use as a down payment on a car. Before beginning your car shopping, you decide to write a program to help you figure out what your monthly payment will be, given the car's purchase price, the monthly interest rate, and the time period over which you will pay back the loan. The formula for calculating your payment is

$$payment = \frac{iP}{1 - (1 + i)^{-n}}$$

where

P = principal (the amount you borrow)

i = monthly interest rate ($\frac{1}{12}$ of the annual rate)

n = total number of payments

Your program should prompt the user for the purchase price, the down payment, the annual interest rate and the total number of payments (usually 36, 48, or 60). It should then display the amount borrowed and the monthly payment including a dollar sign and two decimal places.

2.

In shopping for a new house, you must consider several factors. In this problem the initial cost of the house, the estimated annual fuel costs, and the annual tax rate are available. Write a program that will determine the total cost of a house after a five-year period and run the program for each of the following sets of data.

| Initial House Cost | Annual Fuel Cost | Tax Rate |
|--------------------|------------------|----------|
| 67,000 | 2,300 | 0.025 |
| 62,000 | 2,500 | 0.025 |
| 75,000 | 1,850 | 0.020 |

To calculate the house cost, add the initial cost to the fuel cost for five years, then add the taxes for five years. Taxes for one year are computed by multiplying the tax rate by the initial cost. Write and call a function that displays instructions to the program user.

3.

A cyclist coasting on a level road slows from a speed of 10 mi/hr to 2.5 mi/hr in one minute. Write a computer program that calculates the cyclist's constant rate of acceleration and determines how long the cyclist will take to come to rest, given an initial speed of 10 mi/hr. (*Hint:* Use the equation

$$a = \frac{v_f - v_i}{t}$$

where a is acceleration, t is time interval, v_i is initial velocity, and v_f is final velocity.) Write and call a function that displays instructions to the program user and a function that computes a , given t , v_f , and v_i .

4.

Write a program to take a depth (in kilometers) inside the earth as input data; compute and display the temperature at this depth in degrees Celsius and degrees Fahrenheit. The relevant formulas are

$$\begin{aligned} \text{Celsius} &= 10 (\text{depth}) + 20 && (\text{Celsius temperature at depth in km}) \\ \text{Fahrenheit} &= 1.8 (\text{Celsius}) + 32 \end{aligned}$$

Include two functions in your program. Function `celsius_at_depth` should compute and return the Celsius temperature at a depth measured in kilometers. Function `fahrenheit` should convert a Celsius temperature to Fahrenheit.

5.

Write a program that calculates the speed of sound (a) in air of a given temperature T ($^{\circ}\text{F}$). Formula to compute the speed in ft/sec:

$$a = 1086 \sqrt{\frac{5T + 297}{247}}$$

Be sure your program does not lose the fractional part of the quotient in the formula shown. As part of your solution, write and call a function that displays instructions to the program user.

6.

After studying the population growth of Gotham City in the last decade of the 20th century, we have modeled Gotham's population function as

$$P(t) = 52.966 + 2.184t$$

where t is years after 1990, and P is population in thousands. Thus, $P(0)$ represents the population in 1990, which was 52.966 thousand people. Write a

program that defines a function named `population` that predicts Gotham's population in the year provided as an input argument. Write a program that calls the function and interacts with the user as follows:

```
Enter a year after 1990> 2015
Predicted Gotham City population for 2010 (in thousands):
107.566
```