Tutorial 9

- **Understand the Problem**

This problem will be divided into two parts, the main program source file and a secondary source file containing the subroutines and functions. While this problem is not large enough to require splitting into multiple files, it is split to provide an example of how to use modules. The formulas for the surface area and volume of a sphere are as follows:

$$S = 4 \times \pi \times R^2$$
$$V = \frac{4}{3} \times \pi \times R^3$$

The value of π will be defined as a constant and set to 3.14159.

For this example, the main program will display some initial headers and read the radius from the user. Once the radius is read, the main program will call functions for the surface area and the volume, and a subroutine to display the results.

- **Create the Algorithm**

Based on the problem definition, the steps for the main are:

> **! display header and read radius**
>
> **! call functions for sphere volume and surface area**
>
> **! call routine to display formatted results**

The module will contain the functions and subroutine. The first function will compute the sphere volume. The single step is:

> **! compute the volume of a sphere with given radius.**
>
> **! sphere volume = [(4.0 * pi) / 3.0] * radius^3**

The second function will compute the sphere surface area. The single step is:

> **! compute the volume of a sphere with given radius**
>
> **! sphere volume = 4.0 * pi * radius^2**

The subroutine will display the formatted results.

- **Implement the Program**
- **Debug the program**