1. Explain what a *function* is. How does the *definition* of a function is different from the *declaration* of a function?
2. How is a function executed in a program?
3. What are the three advantages of using functions?
4. The items passed in a *function* call are the ____ ____. The corresponding ____ ____ appear in the function heading.
5. What is function *prototype*? What are the reasons to have function prototype in a program?
6. Can we place functions before the *main( )* function? Or should we place functions after the *main( )* function? What is a global function?
7. When a function accepts multiple *arguments*, does it matter what order the arguments are passed in?
8. What does it mean to *overload* a function?
9. What information can be deduced from the following function declaration?
   ```c
   int type (float x);
   ```
10. What does the following function do?
    ```c
    void nonsense (void)
    {
      cout<<"****\n";
      cout<<"* \n";
      cout<<"****\n";
    }
    ```
11. A function call can appear as a single statement or it can appear within an expression. Explain.
12. Explain the meaning ‘*pass by values*’ functions.
13. Explain the meaning ‘*pass by reference*’ functions.
14. What is a *void* function?

### Programming Exercises

1. Write a program that uses a function to print “What a wonderful day today!”.  
   *Hint: The non-returning value function can be written as:-*
   ```c
   void print()
   { cout<<"What a wonderful day today!"<<endl;}
   ```
2. Write a program that calculates the volume of a sphere using the formula \( \frac{4}{3} \pi r^3 \).  
   The calculation is done by a function that returns the volume of the sphere with the input argument for the radius of the sphere.  
   *Hint: The returning value function can be written as:-*
   ```c
   float volume(int r)
   { float y;
     y = (4.0/3.0)*3.1415*r*r*r;
     return (y);}
   ```
   or can also be done by:-
float volume(int r)
{
    return ((4.0/3.0)*3.1415*r*r*r);
}

3. Write a program that calculates the area and perimeter of a rectangle. The area and perimeter are calculated using two separate functions, which both take two arguments of type float for the width and length of the rectangle.

*Hint: Function to calculate area of rectangle:*

```cpp
float area(float w, float l)
{
    return (w*l);
}
```

*and function to calculate its perimeter is:*

```cpp
float perimeter(float w, float l)
{
    return (2*(w+l));
}
```

4. Write a program that calculates the real roots of a quadratic equation of the form \( ax^2 + bx + c = 0 \), where \( a, b \) and \( c \) are constants. Use pass by value function to calculate the roots.

5. Write a program that calculates the product, quotient and modulus of two read numbers from the keyboard. Calculate the quotient and modulus using function using the pass by value method.

6. Write a program that prompts (do this in a function) the user for the lengths of two legs of a right angle triangle and makes use of the `pow` and `sqrt` functions to compute the length of the hypotenuse using the Pythagorean theorem. You may use a single function to do the calculations.

7. Write a program that calculate the area and perimeter of a right angle triangle with sides \( a, b \) and \( c \), where \( c \) is the hypotenuse. Useful formula \( c^2 = a^2 + b^2 \) and area = \( 0.5(ab) \). The calculation for the area and perimeter must be done in different functions, using:
   a) pass by value method
   b) pass by reference method.

**PART A**

1. The _______ is the part of a function definition that shows the function name, return type, and parameter list.

2. If a function doesn’t return a value, the word ____ would appear as its return type.

3. Consider this function header: `void showValue(int quantity)` Write a statement that call this function, passing the argument value of 5.

4. Values that are sent to a function are called _______.

5. Either a function’s _____ or its ______ must precede all calls to the function.

6. The _______ function causes a program to terminate immediately.

7. Two or more functions may have the same name, as long as their _____ are different.
PART B

1. Locate and correct as many errors as you can.
   a. void total(int val1, val2, val3)
      {return val1+val2+val3;}
   b. float average(int val1, int val2, int val3)
      {float average;
       Average=val1+val2+val3/3;}
   c. void area(int length=30, int width)
      {return length*width;}
   d. void getvalue(int value&)
      {cout<<”Enter a value” “;
       Cin>>value&; }

2. Print out the output of the following program.
   a. int addition (int a, int b)
      { return a+b;}
      main ()
      { int x=5, y=3, z;
         z = subtraction (7,2);
         cout << "The first result is " << z << \n; 
         cout << "The second result is " << subtraction (7,2) << \n; 
         cout << "The third result is " << subtraction (x,y) << \n; 
         z= 4 + subtraction (x,y);
         cout << "The fourth result is " << z << \n; }
   b. void duplicate (int& a, int& b, int& c)
      { a*=3; b*=4; c*=5; }
      main ()
      { int x=1, y=3, z=7;
         duplicate (x, y, z);
         cout << "x=" << x << ", y=" << y << ", z=" << z; }