Review Test Three
Version 1
Programming Problems

Problem 1

Find two syntax errors in the following program:

```
#include <iostream>

using namespace std;

int area(int length, int width = 0);

int main()
{
   int length, width;

      // for rectangle use both arguments
   cout << "Enter length and width of a rectangle" << endl;
   cin >> length >> width;

   cout << "The area is " << area(length, width) << endl;

    // for square, only need first argument
   cout << "Enter side of a square" << endl;
   cin >> length;

   cout << "The area is " << area(length) << endl;

   return 0;
}

int area(int length, int width = 0);
{
   if ( width == 0 )
      return length * length;

   return length * width;
}
```

Solution: Fix the function definition below main

```
// default parameters can only be specified once -- in the declaration above
// semicolon is not required here
int area(int length, int width)
{
   if ( width == 0 )
      return length * length;
   return length * width;
}
```

Problem 2

Find the errors in the following program. **You must use pass by reference.**

```
#include <iostream>
using namespace std;
void area2(int area, int length, int width = 0);
int main()
{
   int length, width, area;
     // for rectangle use two arguments
   cout << "Enter length and width of a rectangle" << endl;
   cin >> length >> width;
   cout << "The area is " << area2(area, length, width) << endl;
     // for squares use one argument
   cout << "Enter side of a square" << endl;
   cin >> length;
   cout << "The area is " << area2(area, length) << endl;
   return 0;
}
void area2(int area, int length, int width)
{
   if ( width == 0 )
      area = length * length;
   else
      area = length * width;
}
```

Solution: Add reference parameters to declaration and definition. Change program to call function outside of cout and set variable for output.

Changing the program to return a value is not allowed due to the requirement to use pass by reference.

```
#include <iostream>

using namespace std;

// Added & to indicate the area is pass by reference
void area2(int &area, int length, int width = 0);

int main()
{
   int length, width, area;
     // for rectangle use two arguments
   cout << "Enter length and width of a rectangle" << endl;
   cin >> length >> width;

   // call area2 to calculate the area and set it in main
   area2(area, length, width);

   // change cout statement to output area, not void function
```

```
    cout << "The area is " << area << endl;
      // for squares use one argument
    cout << "Enter side of a square" << endl;
    cin >> length;

    // call area2 to calculate the area and set it in main
    area2(area, length);

    // change cout statement to output area, not void function
    cout << "The area is " << area << endl;
    return 0;
}

// change function definition by adding & for area
void area2(int &area, int length, int width)
{
    if ( width == 0 )
        area = length * length;
    else
        area = length * width;
}
```

Problem 3

Write a simple program with functions that calculates the perimeter and area of a square.
You will need two functions:

1. Get an integer from the user and return it to the main program (no validation required)
2. Calculate the area and perimeter of the square and return both to the main program (the length of a side is passed in as a parameter)

Main will call the first function and pass its value to the second function. It will then call the second function, save the results, and display them with using a cout statement.

Your second function should not do any I/O. Just get a number from main, calculate the results, and return them.

```
#include <iostream>

using namespace std;

// function to get an integer and return it
int getNumber();int getNumber()
{
   int value;
   cout << "Enter the length of a side " << endl;
   cin >> value;
   return value;
}

// function to calculate area and perimeter
//  must use pass by reference
void doCalc(int side, int & area, int & perimeter)
{
   area = side * side;
   perimeter = 4 * side;
}

int main()
{
   int side, area, perimeter;

   side = getNumber();

   doCalc(side, area, perimeter);

   cout << "For side " << side << " area is " << area
   << " and perimeter is " << perimeter << endl;

   return 0;
}
```