3.3 LAB TASKS

1. Write a program which first computes the volume of a sphere and then the volume of a right circular cone.

   Volume of sphere = $\frac{4}{3}\ \pi\ r^3$

   Volume of cone = $\pi\ r^2 \frac{h}{3}$

   Where "r" is the radius and "h" denotes height.
   Take the value of radius of sphere as 3. In case of cone you are required to take the values of "r" and "h" from the user. Display the results in the same order.
   [25 Marks]

2. Make a very long string containing names of all months like:
   "January, February, March . . . . . December"
   Your job is to write a program which extracts only 1st 3 letters of each month and combine them to look like the following string:
   "Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec"
   Store all the extracted strings one by one in different variables and afterwards concatenate them to get the above string.
   Display the newly made string on output screen.

   [25 Marks]

3. In the heyday of the British Empire, Great Britain used a monetary system based on pounds, shillings, and pence. There were 20 shillings to a pound, and 12 pence to a shilling. The notation for this old system used the pound sign, £, and two decimal points. For example, £5.2.8 meant 5 pounds, 2 shillings, and 8 pence. (Pence is the plural of penny.) The new monetary system, introduced in the 1950s, consists of only pounds and pence, with 100 pence to a pound (like U.S. dollars and cents). We'll call this new system decimal pounds. Thus £6.17.4 in the old notation is £6.87 in decimal pounds approx.

Write a program in which user enters an amount in Great Britain's new decimal-pounds notation (pounds and pence), and the program converts it to the old pounds-shillings-pence notation. An example of interaction with the program might be

```
Enter decimal pounds: 3.51
Equivalent in old notation = 3.10.2.
```

Make use of the fact that if you assign a floating-point value (say 12.34) to an integer variable, the decimal fraction (0.34) is lost; the integer value is simply 12. Use a cast to avoid a compiler warning. You can use statements like

```
float decpounds;              // input from user (new-style pounds)
int pounds;                   // old-style (integer) pounds
float decfrac;                // decimal fraction (smaller than 1.0)
pounds = static_cast<int>(decpounds);          // remove decimal fraction
decfrac = decpounds - pounds;                  // regain decimal fraction
```

You can then multiply decfrac by 20 to find shillings. A similar operation obtains pence.

[25 Marks]

Debugging a code

4. The following code (on next page) is to find the total weight of candies in a pack. It simply takes the weight of one candy and multiply it with the total no. of candies to obtain the total weight of candies per pack.
   You just need to copy and paste the following program in codeblocks. While doing so you may observe that there are some errors which needs to fix but keep calm and do this step by step as:
   - Compile the code first and you will see some errors mentioned by the compiler, these are called **syntax errors or compile time errors**. Try to read/understand them and fix them until you get zero errors/warnings
   - Run the program and verify the produced results with your *manual calculations*. Is it working correctly? If not then it means that there must be some **logical or run time error.** Find them and fix them to get correct results.

```
#include <iostream>
using namespace std;
int main( )
{
const int number_of_bars = 5;
double one_weight, total_weight;

cout << "Enter the number of candy bars in a package\n";
cout << "and the weight in ounces of one candy bar.\n";
cout << "Then press return.\n";
cin << number_of_bars;
cin << one_weight;

total_weight = one_weight * number_of_bars;

cout << number_of_bars << " candy bars\n";
cout << one_weight << " ounces each\n";
cout << "Total weight is " << total_Weight << " ounces.\n";

cout << "Try another brand.\n";
cout << "Enter the number of candy bars in a package\n";
cout << "and the weight in ounces of one candy bar.\n";
cout << "Then press return.\n";
cin >> number_of_bars;
cin >> total_weight;

total_weight = one_weight * number_of_bars;

cout << number_of_bars << " candy bars\n";
cout << one_weight << " ounces each\n";
cout << "Total weight is " << total_weight << " ounces.\n";

cout << "Perhaps an apple would be healthier.\n";

return 0;
}
```

[25 Marks]