Computer Laboratory - lab sheet 5

Task 1

Copy the program given below. Save (as `trigo.cpp`), compile and run it.

```
// Trigonometric Table
#include <iostream>
#include <cmath>
using namespace std;

int main(){
  cout.precision(3);
  cout << fixed;
  for(int deg=0; deg <= 90; deg += 5){
     double x = deg * M_PI/180.0;
     cout << deg << '\t' << sin(x) << '\t' << cos(x) << endl;
  }
}
```

Task 2

Copy the program given below. Save (as `mean.cpp`), compile and run it.

```
// Mean of n numbers
#include <iostream>
using namespace std;

int main(){
  int n;
  cout << "How many values will you input? ";
  cin >> n;

  double x, mean, total = 0.0;

  for (int i=1; i<=n; ++i) {
    cout << "Input value " << i << ": ";
    cin >> x;
    total = total + x;
  }

  mean = total/n;

  cout << "The sum  is " << total << endl;
  cout << "The mean is " << mean << endl;

  return 0;
}
```

Task 3

Modify the program in Task 2 in order to calculate <u>also</u> geometric mean of *n* numbers. The geometric mean of the data set $(x_1, x_2, \cdots, x_n)$ are given by

$$G = \left(\prod_{i=1}^{n} x_i\right)^{1/n} = \sqrt[n]{x_1 x_2 \cdots x_n}$$

Task 4

Write programs to prove the following relation:

$$\sum_{k=1}^{n} k(k+1) = 1.2 + 2.3 + \cdots + n(n+1) = \frac{n(n+1)(n+2)}{3}$$

Task 5

An Armstrong number is an integer such that the sum of the cubes of its digits is equal to the number itself. For example, 371 is an Armstrong number since $3^3 + 7^3 + 1^3 = 371$.
Write a C++ program to find all Armstrong numbers in the range of 0 and 999.