Assignment 1

Due: Wednesday, September 21, 11:59pm
Send a zip file to Benjamin Crysup (brc13c@my.fsu.edu) that contains a copy of your commented program and the output. Put them into a folder that has your name and the assignment number, for example the folder `beerli1` contains the code count.cpp, output.txt. Compress the folder (using zip) and attach (for example it would be beerli1.zip).

1. Write a program called count (use count.cpp as the filename) [a good template is the von-neumann.cpp file]. The program should print out the following table:

   ```
   index x x2 x3
   0 0 0 0
   1 1 1 1
   2 2 4 8
   3 3 9 27
   4 4 16 64
   5 5 25 125
   ... up to an index of 10
   ```

   (a) write a pseudocode in the comments

   (b) the program should be able to compile with g++ -o count count.cpp

   (c) only present the code file count.cpp

   (d) Do NOT worry about the formatting too much! As long as we can read the numbers, it will OK.

2. Write a integration program that returns the area of the following function

$$f(x) = 20 - x^3 - \frac{1}{x^4}$$

   within the boundaries of $a = 0.5$ and $b = 2.5$, Mathematica calculates the area under the curve as 27.6047, your results will need to come close to that. Use the approach I have shown you in the lecture of Thursday September 15. Here is the pseudocode for this assignment.

   ```
   Get the number n
   Initialize the random number generator
   Do n times:
      draw a random number in the range a,b
      evaluate the function y=f(x)
      add y to the sum
   Divide the sum by n (this is the average of y) and multiply by (b-a)
   print the result
   ```

   The problem with this is that you do not know how to draw random numbers between a and b, so far, we have only drawn random numbers between 0 and 1. Here the code to draw random numbers between a and b:

```cpp
double uniform(double a, double b)
{
  // draws random number between 0..1
  double x = random() / (double) RAND_MAX;
  return a + (b-a) * x;
}
```

  (a) turn in the program (call it integrator.cpp) [it should compile without error]

I suggest to start early with this assignment so that if there are problems with the coding you have time to ask Ben or me. Use the examples for our class (all will be posted on the website). The program about Pi is a good template for both of the assignments. Use the internet to look up things not to copy code!