**Programming Assignment 3**

1. Write a program that randomly generates a string of up to N alphabets (a, b, … y, z, A, B, … X, Y, Z), where N is given as a positive integer by the input.

**Input:** 13

**Output:** atabcXQWZGRfc

Notice that the above output is just an example. Your output should change from run to run. That is, you need to use srand that takes a *seed* different from each run. Paste your code below:

2. Write a function is\_prime that takes a positive integer X and returns 1 if X is a prime number, or 1 if X is not a prime number. Past your code below:

int is\_prime(int X) {

// your code starts below; returns 1 if X is prime or 0 otherwise

}

3. Now, write a program that takes a positive integer N and prints all prime numbers from 2 to N by calling your function is\_prime written in question 2. Past your code below:

int main ( ) {

int N;

std::cin >> N;

// print all prime numbers in the range [2, N]

// using is\_prime function from the previous question

}

4. Write a program to print all Armstrong numbers between 1 and 500. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number. For example, 153 = ( 1 \* 1 \* 1 ) + ( 5 \* 5 \* 5 ) + ( 3 \* 3 \* 3 ). Paste your code below:

Step 1: write a function is\_Armstrong\_number that returns 1 if the give number is a Armstrong number, or 0 if not.

int is\_Armstrong\_number(int N) {

// your code

}

Step 2: use the previous function to complete the program

int main() {

int N;

std::cin >> N

// code to print all Armstrong numbers in the range [1, 500]

}

5. Write a program to compute sin(x) for given x. The user should supply x and a positive integer n. We compute the sine of x using the series and the computation should use all terms in the series up through the term involving x

sin(x) = x - x3/3! + x5/5! - x7/7! + x9/9! ...

In the above example, we have written 5 terms (n=5, until 9!) before going infinite. The more terms you compute, the more accurate you have for sin(x). Paste your code below:

Step 1: write a function compute\_term that computes the i-th term:

float compute\_term(float x, int i) {

// for example, i=3, return x5/5!

}

Step 2: complete the program using the previous function compute\_term

float x;

int n;

std::cout<<"Enter the value of x: ";

std::cin >>x;

std::cout<<"Enter the value of n: ";

std::cin >>n;

// Your code to compute sin(x)