**Name:**

**Advanced Programming in C++**

**Number Systems**

**Lab Exercise 3/14/2024**

In this lab you will explore the mathematical concepts of number systems. You will use your programming skills to solve these problems. You are to submit your documented source code including a sample output.

1. Find all of the two digit numbers that are equal twice the sum or their digits.
2. Write a function using the following prototype:

int countBits(int);

The function is given a base 10 integer and returns the number of 1s in the base 2 equivalent. Write a main function to test your function.

1. Write a program that will convert a base 10 number into any base from 2 – 16. For bases greater than 10, use the symbols A, B, C, D, E, and F.
2. We will write a program to calculate the square root of 2 (an irrational number) numerically.



Start with x = 1 and repeatedly replace x with the arithmetic mean of . If we keep repeating this operation, x will get closer and closer to . Write your program

that uses this method to evaluate accurately to at least 5 digits after the decimal

point. This accuracy is achieved when . Display your estimate and the number of iterations required to obtain it. Also compare your result with the

value obtained by sqrt(2) from the math library.