CSE122 Computer Programming

Sheet 3 (Loops)

1) For the following program segment:

```
int i,j;
for ( i=0; i<10; ++i)
{
    for(j=0; j<i; j++)
        cout << i*j;
    cout << Good Luck;
}
```

a) How many times does the first call to **cout** execute?
b) How many times does the second call to **cout** execute?
c) What is the last value displayed?
d) Evaluate the output of the program manually showing each step in detail.

2) Rewrite the following program segment using **while**() loop.

```
int  x, i, n, count=0;
for ( i=0; i<n; i++)
{
    cin >> x;
    if (x==i) ++count;
}
```

3) Write a program to Calculate the following series summations:

a) $1^2+2^2+3^2+4^2+ \ldots\ldots\ldots +n^2$

b) $1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\ldots\ldots\ldots\ldots+\frac{1}{n}$

c) $1+\frac{3}{2^2}+\frac{5}{3^2}+\frac{7}{4^2}+\ldots\frac{2n-1}{n^2}$

d) $k+2*k+3*k+4*k+\ldots\ldots\ldots+N*k$

e) $\frac{1}{A}+\frac{1}{A+B}+\frac{1}{A+2B}+\frac{1}{A+3B}+\ldots\ldots\ldots+\frac{1}{A+NB}$

4) Using the following formula, write a program to calculate sin(x):

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + ...$$

Evaluate the output of the program manually when x=π/6.

5) Trace the following C program's segments showing its output:

```
int main()
{
    long num=6543;
    do
    {
        cout << (num%10);
        num /= 10;
    }while (num != 0);
    cout << endl;
    return(0);
}
```

6) Write a program that computes and prints the sum of all integers from 1 to 100, and divisible by 2 and 3.

7) Write a program to read a collection of exam scores ranging in values from 1 to 100. Your program finds and prints the average, the maximum, and the minimum scores.

8) Write a program that counts characters and words entered by the user. The program terminates when the user presses the enter key.

9) Suppose at present the population of countries A and B are 52 and 85 million people respectively. Print the population of A and B each year until the population of A exceeds the population of B, and find the number of years N needed. Suppose the rates of population growth of A and B are 6% and 4% receptively.

9) Write a program to calculate the factorial of a given number, n. What will be the maximum value of n at which the program works correctly? You can use computer to find that value. Justify your answer.

10) Draw the following pattern:

```
    *
   * * *
  * * * * *
 * * * * * * *
  * * * * *
   * * *
    *
```