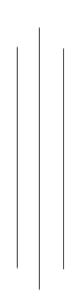
INSTITUTE OF ENGINEERING

Pulchowk Campus, Lalitpur



Subject: C Programming

Lab Report 1 and 2

Tittle: Nested Looping Structure

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Content of Lab Report:

Background Information

C Programming

Editor Used

Compiler

Nested Loop Structure

Code and Output

Source Code

Output

Analysis

Conclusion

Background Information

What is C Programming?

C programming is a general-purpose, procedural, imperative computer programming language developed in 1972 by Dennis M. Ritchie at the Bell Telephone Laboratories to develop the UNIX operating system. C is the most widely used computer language.

Why to Learn C Programming?

- Easy to learn
- Structured language
- It produces efficient programs
- It can handle low-level activities
- It can be compiled on a variety of computer platforms

Editor

Here, I have used Visual Studio Code as my editor. You can download the editor from Download Visual Studio Code - Mac, Linux, Windows . Select your operating system and download it.

Compiler

Here, I have used **gcc** as my compiler provided by MinGWw64. You can download it via <u>Download MinGW-w64 - for 32 and 64 bit Windows from SourceForge.net</u>. Your download will start automatically. Run the downloaded .exe file. After, you have installed MinGW-w64, you need to configure it.

In the Windows search bar, type 'settings' to open your Windows Settings.

Search for Edit environment variables for your account.

Choose the Path variable and then select Edit.

Select New and add the Mingw-w64 destination folder path to the system path. The exact path depends on which version of Mingw-w64 you have installed and where you installed it. If you used the settings above to install Mingw-w64, then add this to the path: C:\Program Files\mingw-w64\x86_64-8.1.0-posix-seh-rt_v6-rev0\mingw64\bin.

Select OK to save the updated PATH. You will need to reopen any console windows for the new PATH location to be available.

Check your installation

Open command prompt or power shell and type:

```
C:\Users\user>gcc --version
gcc (x86_64-posix-seh-rev0, Built by MinGW-W64 project) 8.1.0
Copyright (C) 2018 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

```
C:\Users\user>gcc
gcc: fatal error: no input files
compilation terminated.
C:\Users\user>_
```

If you get similar result, you are good to go.

Nested Looping Structure

If a loop I present inside another loop the it is called nested loop structure

```
while(test_expression)
{
    statements;    while(test_expression) {        statements;
}

for ( init; condition; increment)
{
        for ( init; condition; increment)
        {        statement(s);    }

        statement(s);
}
```

```
do { statement(s); } while (condition );}
while (condition);
```

CODE AND OUTPUT

1.Program to print a multiplication table of MXN. Read the values of M and N from the user.

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
  int m, n;
  system("cls");
  printf("Multiplication Table of: ");
  scanf("\%d", \&m);
  printf("Upto : ");
  scanf("\%d", \&n);
  printf("Multiplication Table of %d from 1 to %d is: \n", m, n);
  for (int i = 1; i <= n; i++)
    printf("\%d * \%d = \%d \mid n", m, i, m * i);
  getch();
  return 0;
```

```
Multiplication Table of : 15
Multiplication Table of 15 from 1 to 13 is :
               15
15
               30
15
              45
15
             60
              75
       6 = 90
7 = 105
15
15
15
       8 = 120
15
              135
15
       10 = 150
15
               165
       11
15
               180
       12
       13 = 195
```

2. Write a program to display the chessboard pattern.

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{

system("cls");

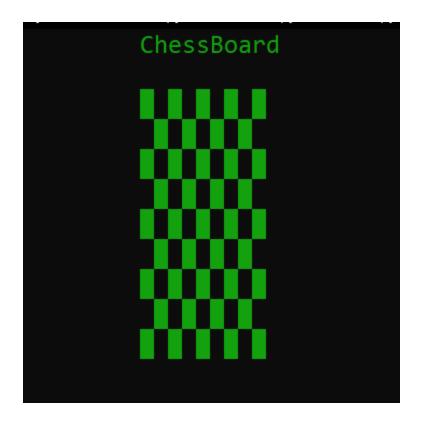
printf("\t\tChessBoard\n\n");

for (int i=0; i<9; i++)
{

printf("\t\t");

for (int j=0; j<9; j++)
```

```
 if ((i+j)\% 2 == 0) 
 \{ printf("\xdb"); 
 else 
 \{ printf(""); 
 \} 
 printf("\n"); 
 getch(); 
 return 0;
```



3.Write a program to read two integer (n1 and n2, both positive and n1<n2) from the user amd display the prime and palidrome number between n1 and n2. Display their count also

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
    unsigned int n1, n2, prime_count = 0, remainder, reverse = 0, copy_number,
pallidrome_count = 0, number;
    system("cls");
    printf("Value of n1: ");
    scanf("%u", &n1);
    printf("Value of n2: ");
```

```
scanf("%u", &n2);
for (int number = n1; number <= n2; number ++)
 int i = number - 1;
   if(number == 0 / / number == 1)
  else
  {
    for (; i; i--)
       if(!(i == 0 // i == 1))
         if(number \% i == 0)
           break;
       else
         prime_count++;
  copy_number = number;
  while (copy_number != 0)
```

```
remainder = copy_number % 10;
    reverse = reverse * 10 + remainder;
    copy_number = copy_number / 10;
  if(number == reverse)
    pallidrome_count++;
  else
  reverse = 0;
printf("\nFrom %d to %d\n", n1, n2);
printf("Number of primes is %d\n", prime_count);
printf("Number of paliidrome number is %d\n", pallidrome_count);
getch();
return 0;
```

```
Value of n1: 3
Value of n2: 15
From 3 to 15
Number of prime is 5
Number of paliidrome number is 8
```

4.Write a program to find the sum of all positive number entered by the user. Read the numbers and keep calculating the sum until the user enter 0. */

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
  int\ number,\ sum=0,\ count=0;
  system("cls");
  while (1)
  {
    printf("Positive Number: ");
    scanf("%d", &number);
     if(number == 0)
       break;
    else if (number > 0)
       sum = sum + number;
       count++;
  printf("\n Total sum is %d\n", sum);
  printf("Total number of positive numbers is %d", count);
```

```
getch();
return 0;

Output:
Positive
Positive
```

```
Positive Number : 45
Positive Number : 12
Positive Number : 16
Positive Number : 13
Positive Number : 0

Total sum is 86
Total number of positive number is 4
```

5.1

Question:

```
1,2,3,4,5, 6.....n
```

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
   int n;
   system("cls");
   printf("Value of n: ");
   scanf("%d", &n);
   printf("\nNumber for 1 to n is listed below: \n\n", n);
```

```
for (int i = 1; i <= n; i++)
{
    printf("%d", i);
}
getch();
return 0;
}</pre>
```

```
Number for 1 to n is listed below:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27 28 29 30 31
32 33 34 35 36 37 38 39 40 41 42 43 44 45
46 47 48 49 50
```

5.2

Questions:

```
2,4,6,8,10 .....,2n
```

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
    int n;
    system("cls");
```

```
printf("Value of n: ");
scanf("%d", &n);
printf("\nNumber for 2 to 2n is listed below: \n\n", n);
for (int i = 1; i <= n; i++)
{
    printf("%d", 2 * i);
}
getch();
return 0;
}</pre>
```

```
Value of n: 10

Number for 2 to 2n is listed below:
2 4 6 8 10 12 14 16 18 20
```

5.3

Question:

```
1,2,5,10,17,26.....
```

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
  int n, term = 1;
```

```
system("cls");
printf("Value of n: ");
scanf("%d", &n);
printf("Sequence is \n\n");
for (int i = 0; i < n; i++)
{
    printf("%d", term);
    term = term + (2 * i + 1);
}
getch();
return 0;
}</pre>
```

```
Value of n: 10
Sequence is
1 2 5 10 17 26 37 50 65 82
```

5.4

```
(1^2 + 2^2)/2, (2^2 + 3^2)/3, ......
```

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
#include<math.h>
int main ()
```

```
int n;
  system("cls");
  printf("Value of n: ");
  scanf("\%d", \&n);
  printf("\nSequence is:\n");
  for (int i = 1; i <= n; i++)
  {
    printf("(\%d^2 + \%d^2)/\%d", i, i + 1, i + 1);
  }
  printf("\n\nRespective Value is:\n");
  for (int i = 1; i <= n; i++)
    printf("\%.3f", (pow(i, 2) + pow(i + 1, 2))/(i + 1));
  }
  getch();
  return 0;
}
```

```
Value of n: 8

Sequence is:
(1^2 + 2^2)/2 (2^2 + 3^2)/3 (3^2 + 4^2)/4 (4^2 + 5^2)/5 (5^2 + 6^2)/6 (6^2 + 7^2)/7 (7^2 + 8^2)/8 (8^2 + 9^2)/9

Respective Value is:
2.500 4.333 6.250 8.200 10.167 12.143 14.125 16.111
```

```
1,1/3,1/5.....,1/(2n-1)
Source Code:
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
  int n;
  system("cls");
  printf("Value of n: ");
  scanf("%d", &n);
  printf("\nSequence\ is: \n\n", n);
 for (int i = 1; i <= n; i++)
    printf("1/%d", 2 * i -1);
  getch();
  return 0;
}
Output:
Value of n: 10
Sequence is:
```

1/1 1/3 1/5 1/7 1/9 1/11 1/13 1/15 1/17 1/19

6.1

Question:

```
2+4+6+8+10+.....+ 2n
```

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
  int n;
  system("cls");/*CLear the screen*/
  printf("Value of n: ");
  scanf("%d", &n);
  printf("\nSequence\ is: \n\n");
  for (int i = 1; i <= n; i++)
    printf("%d", 2 * i);
      if(n == i)
       break;
     else
       printf("+");
  getch();
  return 0;
```

```
}
```

```
Value of n: 10

Sequence is:
2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20
```

6.2

Question:

```
1-1/1! +1/2! -1/3!.....(-1) ^n/ (n-1)! n =0,1,2,3.....
```

Source Code:

#include <stdio.h>

```
#include <conio.h>
#include <stdlib.h>
#include <math.h>

int main ()

{
    int n;
    system("cls");
    printf("Value of n: ");
    scanf("%d", &n);
    printf("\n\nSequence is:\n");
    for (int i = 1; i <= n; i++)
    {
        if (i == 1)
```

```
printf("1 ");
   else
      printf("1/(%d)! ", (i - 1));
   if(n == i + 1)
      break;
   else
      if (i \% 2! = 0)
         printf(" + ");
      else
         printf(" - ");
printf("\n\n Respective\ Value:\n"); \ /*\ Information*/
for (int i = 0; i < n; i++)
 {
    printf("\%f", ((float)1 / tgamma(i+1))); /*Print the value
```

```
if(n == i+1)
      break;
    }
    else
    {
       if(i\%2! = 0)
        printf(" + ");
       }
       else
         printf(" - ");
    }
  }
  getch();
  return 0;
}
```

```
Sequence is:
1 + 1/(1)! - 1/(2)! + 1/(3)! - 1/(4)! + 1/(5)! - 1/(6)!

Respective Value:
1.000000 - 1.000000 + 0.500000 - 0.166667 + 0.041667 - 0.008333 + 0.001389 - 0.000198
```

6.3

```
1-x^2/2+x^4/4!.....(-1)^i*x^(2i)/(2i)! i =0,1,2,3....
```

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
#include <math.h>
int main ()
  int x, n;
  system("cls");
  printf("Value of x: ");
  scanf("%d", &x);
  printf("Value of n: ");
  scanf("\%d", \&n);
 printf("\nSequence\ is:\n\n");
  for (int j = 0; j < n; j++)
    if(j == 0)
       printf("1 ");
     else
       printf("x^{d}/(%d)!", 2 * j, 2 * j);
    if(n == j + 1)
       break;
```

```
else {
  if (pow(-1, j) > 0)
    printf(" - ");
  else
    printf(" + ");
printf("\n\nRespective Value:\n");
for (int k = 0; k < n; k++)
if(k == 0)
    printf("1 ");
  else
  {
    printf("\%.8f", pow(x, 2*k)/tgamma(2*k+1));
  If (n == k + 1)
     break;
```

```
}
else
{
    if (pow (-1, k) > 0)
    {
        printf(" - ");
    }
    else
    {
        printf(" + ");
    }
}
getch();
return 0;
}
```

```
Value of x: 5
Value of n: 4

Sequence is:

1 - x^2/(2)! + x^4/(4)! - x^6/(6)!

Respective Value:
1 - 12.500000000 + 26.04166667 - 21.70138889
```

Questions:

 $1+ x/1! + x^2/2! + x^3/3!$ till sum of terms is less than 10^-6

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
#include<math.h>
int main()
{
   int\ power = 0;
  double x, term = 1, sum\_of\_term = 0, condition;
  system("cls");
  printf("Value of x: ");
  scanf("\%lf", \&x);
  printf("\n\nSequence with value of x till term>10^-6: \n");
  while (condition >(double)0) {
    term = pow(x, power) / tgamma(power + 1);
    printf("%.10f +", term);
    sum\_of\_term = term + sum\_of\_term;
    condition=term - 0.000001;
    power++;
  printf("\n\nSum\ of\ term: \%.5f\n", sum\_of\_term);
  printf("\nAt \%d term, term is less than 10^-6\n", power);
  getch();
  return 0;
```

```
Value of x: 1

Sequence with value of x till term>10^-6:
1.0000000000 +1.0000000000 +0.5000000000 +0.1666666667 +0.0416666667 +0.0083333333 +0.0013888889 +0.0001984127 +0.0000248016 +0.00000275 57 +0.0000002756 +

Sum of term : 2.71828

At 11 term,term is less than 10^-6
```

```
8.1
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
Source Code:
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main()
  int n;
  system("cls");
  printf("Value of n: ");
  scanf("%d", &n);
  printf("Sequence is: \n\n");
```

```
for (int i = 1; i <= n; i++)
{
    for (int j = 1; j <= i; j++)
    {
        printf("%d", j);
    }
    printf("\n");
}
getch();
return 0;
}</pre>
```

```
Value of n: 6
Sequence is:

1
1
2
1
2
3
1
2
3
4
1
2
3
4
5
1
2
3
4
5
```

```
8.2
5 4 3 2 1
5 4 3 2
5 4 3
5 4
```

Source Code:

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
  int n;
  system("cls");
  printf("Value of n: ");
  scanf("%d", &n);
  printf("Sequence is: \n\n");
  for (int i = 0; i < n; i++)
    for (int j = n; j > i; j - -)
     {
       printf("%d ", j);
    printf("\n");
  getch();
  return 0;
```

```
Value of n: 5
Sequence is:

5  4  3  2  1
5  4  3  2
5  4  3
5  4  3
5  4
```

```
8.3
  N
  \mathbf{E} \mathbf{E}
  P P P
  A A A A
  LLLLL
 Source Code:
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
  system("cls");
  printf("Sequence is:\n");
for (int i = 1; i <= 5; i++)
  {
```

```
for (int j = 0; j < i; j++)
   if(i == 1)
     printf("N");
   else if (i == 2)
     printf("E");
   else if (i == 3)
     printf("P ");
   else if (i == 4)
     printf("A ");
   else if (i == 5)
     printf("L");
printf("\n");
```

getch();

```
return 0;
Output:
Sequence is :
8.4
A
A B
A b C
A B C D
A b C d E
Source Code:
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
  system("cls");
 for (int i = 0; i < 5; i++)
  {
    for (int j = 0; j <= i; j++)
```

```
if (i % 2 == 0 && j % 2! = 0)
{
          printf("%c", 65 + j + 32);
}
else
{
          printf("%c", 65 + j);
}
printf("\n");
}
getch();
return 0;
}
```



8.5

Pattern:

```
####*
###**
##***
```

Source Code:

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
  system("cls");
  for (int i = 0; i < 5; i++)
  {
    for (int j = 0; j < 5; j++)
       if(i+j<4) {
       printf("# ");
       else {
         printf("* ");
    printf("\n");
  getch();
  return 0;
```

```
8.6
      4
    34
 234
1234
 234
   34
      4
Source Code:
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
  system("cls");
 for (int i = 0; i < 7; i++)
  {
    for (int j = 1; j <= 4; j++)
    {
       if(i + j) = 4 \&\& i - j! = 3 \&\& i - j! = 4 \&\& i - j! = 5)
```

```
{
        printf("%d", j);
    }
    else
        {
            printf("");
        }
        printf("\n");
}

getch();
return 0;
```

```
4
3 4
2 3 4
1 2 3 4
2 3 4
3 4
4
```

```
/*
* * * * *

* * * * *
```

```
* *
```

*

*/

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
  int n, space;
   system("cls");
  printf("Value of n: ");
  scanf("%d", &n);
  printf("Sequence is: \n");
   for (int i = n; i >= 0; i--)
  {
     space = n - i;
     while (space! = 0)
       printf(" ");
       space--;
   for (int j = 0; j < i; j++)
       printf("* ");
```

```
printf("\n");
}

getch();
return 0;
}
```

```
Value of n: 5
Sequence is:
* * * * *
* * * *
* * *
```

8.8 Print the following pattern:

```
0
    1 1
   2
        2
  3
         3
 2
   4
          2
1 5 5
            1
    6
            0
    5 5
1
           1
 2
        6
           2
```

```
3 3
2 2
1 1
```

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
   system("cls");
   for (int i = 0; i < 13; i++)
    for (int j = 0; j < 13; j++)
       if(i <= 6)
          if((i + j) == 6 // (j - i) == 6)
            if (i <= 3)
              printf("%2d ", i);
            else
            {
               if((i + j) == 6) {
               printf("%2d ", j);
```

```
}
       else {
          printf("%2d", 12 - j);
  else if (i > 3 && (i == j // (i + j) == 12))
    printf("%2d ", i);
  else
     printf(" ");
else if (i > 6)
{
  if(((i-j) == 6 // (i+j) == 18))
     if (i <= 9)
       if(i-j == 6)  {
       printf("%2d ", j);
       }
       else {
          printf("%2d", 12 - j);
       }
```

```
}
          else
            printf("%2d", 12 - i);
          }
       }
       else if (i < 10 \&\& (i == j // (i + j) == 12))
          if(i+j == 12) \{
          printf("%2d", j);
          else {
            printf("%2d", j - 2);
       }
       else
          printf(" ");
  printf("\n");
getch();
return 0;
```

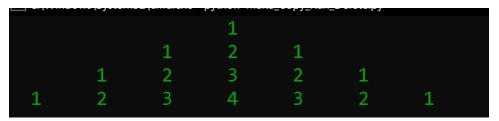
8.9

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
    system("cls");
    for (int i = 1; i <= 4; i++)</pre>
```

```
{
  for (int j = 0; j < 7; j++)
  {
     if(i + j) = 4 \&\& j - i! = 3 \&\& j - i! = 4 \&\& j - i! = 5)
     {
       if(j == 3)
          printf(" %d ", i);
       else if (j == 2 | / j == 4)
       {
          printf(" %d ", i - 1);
       else if (j == 1 // j == 5)
          printf(" %d ", i - 2);
       }
       else
       {
          printf(" %d ", i - 3);
     else
       printf(" ");
```

```
printf("\n");
}

getch();
return 0;
}
```



9. Write a program to find the sum of all positive number entered by the user. Read the numbers and keep calculating the sum until the user enter n.

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
int main ()
{
    int number,sum = 0, count = 0;
    char input_number;
    system("cls");
    while (1)
    {
        printf("Positive Number: ");
        scanf(" %[n,0-9]", &input_number);
        if (input_number == 'n')
```

```
{
    break;
}
else
{
    number = input_number - 48;
    sum = sum + number;
    count++;
}

printf("\nTotal sum is %d\n", sum);
printf("Total number of positive numbers is %d", count);
getch();
return 0;
}
```

```
Positive Number: 15
Positive Number: 16
Positive Number: 45
Positive Number: 16
Positive Number: 62
Positive Number: n

Total sum is 13
Total number of positive number is 5
```

Through this lab activities we are able to understands concept behind nested loop

Why should we use it?

When we should use it what kind of program can be done using it?

Also, it builds our logic development in nested looping

Conclusion

We learn about nested loop.