

Assignment 4: Looping Statement

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F24

U21CS089

1. Print the output for the following series

a) $1 + 4 - 9 + 16 - 25 + 36 \dots + n^2$

```
//Q1
#include <stdio.h>
int main(){
    int i, n, sum=1, k;
    printf("Enter no. of terms - ");
    scanf("%d", &n);
    for (i=2; i<=n; i++){
        if (i%2 == 0){
            k = 1;
        }
        else{
            k = -1;
        }
        sum = sum + k*i*i;
    }
    printf("Sum of series 1 + 4 - 9 + 16 - 25 + 36 + n^2(-1)^n
upto %d terms is %d", n, sum);
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/Colleg
ssignment-4
Enter no. of terms - 6
Sum of series 1 + 4 - 9 + 16 - 25 + 36 + n^2(-1)^n upto 6 terms is 23
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> █
```

b) $1^2 + 2^2 + 3^2 + 4^2 + \dots + n^2$

```
//Q1-b
#include <stdio.h>
int main(){
    int i, n, sum=0;
    printf("Enter no. of terms - ");
    scanf("%d", &n);
    for (i=1; i<=n; i++){
        sum = sum + i*i;
    }
    printf("Sum of series: 1^2 + 2^2 + 3^2 + 4^2 + ... + n^2 upto %d terms is %d", n, sum);
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/Col
ssignment-4
Enter no. of terms - 5
Sum of series: 1^2 + 2^2 + 3^2 + 4^2 + ... + n^2 upto 5 terms is 55
```

c) $x - x^3/3! + x^5/5! - x^7/7! + x^9/9! \dots$

```
//Q1-c
#include <stdio.h>
int main(){
    int i, j, t, n, k=1;
    float x, fact=1, sum=0;
    printf("Enter no. of terms (n) - ");
    scanf("%d", &n);
    printf("Enter the value of x - ");
    scanf("%f", &x);
    for(i=1; i<=n; i++){
        t = 2*i - 1;
        for(j=1; j<t; j++){
            x = x*x;
            fact = fact*(j+1);
        }
        sum += k*(x/fact);
        k = k*(-1);
    }
}
```

```

    printf("Sum of Series:  $x - x^3/3! + x^5/5! - x^7/7! + x^9/9!$ 
upto %d terms is %f", n, sum);
}

```

```

garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/College/FC
ssignment-4
Enter no. of terms (n) - 5
Enter the value of x - 1
Sum of Series:  $x - x^3/3! + x^5/5! - x^7/7! + x^9/9!$  upto 5 terms is 0.834722

```

d) Given Number is Armstrong number or Not. ($153 = 1^3 + 5^3 + 3^3$)

```

//Q1-d
#include <stdio.h>
int main(){
    int i;
    float num, num1, num2 = 0;
    printf("Enter a number to check if its Armstrong or Not - ");
    scanf("%f", &num);
    num1 = num;
    for (i=num1; i>0; i = num1){
        i = i%10;
        num2 = num2 + i*i*i;
        num1 = num1/10;
    }
    if (num2 == num){
        printf("YES. ARMSTRONG !");
    }
    else {
        printf("NO !!");
    }
}

```

```

garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitsha
ssignment-4
Enter a number to check if its Armstrong or Not - 135
NO !!
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitsha
ssignment-4
Enter a number to check if its Armstrong or Not - 153
YES. ARMSTRONG !
garvitshah@Garvits-MacBook-Air ~/D/C/FCP>

```

e) Given Number is Strong number or Not. ($145 = 1! + 4! + 5!$)

```
//Q1-e
#include <stdio.h>
int main(){
    int k, i, m=0, fact, n;
    printf("Enter the number to check - ");
    scanf("%d", &n);
    k = n;
    while(n > 0){
        fact = 1;
        for(i=1; i<=(n%10); i++){
            fact *= i;
        }
        m += fact;
        n = n/10;
    }
    if(m == k){
        printf("%d is a Strong Number", k);
    }
    else{
        printf("%d is not a Strong Number", k);
    }
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/ga
ssignment-4
Enter the number to check - 245
245 is not a Strong Number
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/ga
ssignment-4
Enter the number to check - 145
145 is a Strong Number
```

2. Print the following patterns: (Nested for loops)

A)

```
//Q2-a
#include <stdio.h>
int main(){
    int n, i, j, k;
    printf("Enter the length - ");
    scanf("%d", &n);
    for (i = 1; i <= n; i++){
        for (j = 0; j <= n-i; j++){
            printf(" ");
        }
        for (k = 1; k <= i; k++){
            printf("* ");
        }
        printf("\n");
    }
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/ga
ssignment-4
Enter the length - 5
    *
   * *
  * * *
 * * * *
* * * * *
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/ga
ssignment-4
Enter the length - 3
    *
   * *
  * * *
```

B)

```
//Q2-b
#include <stdio.h>
int main(){
    int n, i, j;
    printf("Enter the length - ");
    scanf("%d", &n);
    for (i=0; i< n; i++){
        for (j = 1; j <= n-i; j++){
            printf("%d", j);
        }
        printf("\n");
    }
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/De
llege/FCP/"tempCodeRunnerFile
Enter the length - 5
12345
1234
123
12
1
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/De
llege/FCP/"tempCodeRunnerFile
Enter the length - 7
1234567
123456
12345
1234
123
12
1
```

C)

```
#include <stdio.h>
int main(){
    int n, i, j;
    printf("Enter the length - ");
    scanf("%d", &n);
    for (i = 1; i <= n; i++){
        for (j = i; j >= 1; j--){
            printf("%d ", j*j);
        }
        printf("\n");
    }
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/assignment-4"
Enter the length - 5
1
4 1
9 4 1
16 9 4 1
25 16 9 4 1
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/assignment-4"
Enter the length - 4
1
4 1
9 4 1
16 9 4 1
```

D)

```
//Q2-d
#include <stdio.h>
int main(){
    int n, i, j;
    printf("Enter the length - ");
    scanf("%d", &n);
    for (i = 1; i <= n; i++){
        for (j = 1; j <= i; j++){
            printf("%d", j);
        }
    }
}
```

```

        for (j = 0; j <= 2*(n - i); j++){
            printf(" ");
        }
        for (j = i; j > 0; j--){
            printf("%d", j);
        }
        printf("\n");
    }
}

```

```

garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah
ssignment-4
Enter the length - 5
1          1
12         21
123        321
1234       4321
12345      54321
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah
ssignment-4
Enter the length - 4
1          1
12         21
123        321
1234       4321

```


E)

```
//Q2-e
#include <stdio.h>
int main(){
    int n, i, j;
    printf("Enter the length - ");
    scanf("%d", &n);
    for (i = 1; i <= n; i++){
        for (j = 1; j <= i; j++){
            printf("%d ", j);
        }
        printf("\n");
    }
    for (i = 1; i <= n-1; i++){
        for(j = 1; j <= n-i; j++){
            printf("%d ", j);
        }
        printf("\n");
    }
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/Assignment-4"
Assignment-4
Enter the length - 5
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/Assignment-4"
Assignment-4
Enter the length - 4
1
1 2
1 2 3
1 2 3 4
1 2 3
1 2
1
```

F)

```
//Q2-f
#include <stdio.h>
int main(){
    int n, i, j;
    printf("Enter the length - ");
    scanf("%d", &n);
    for (i = 1; i <= n; i++){
        for (j = 1; j <= 2*(n-i); j++){
            printf(" ");
        }
        for (j = 0; j < (2*i-1); j++){
            printf("%c ", 65 + 2*j);
        }
        printf("\n");
    }
    for (i = n-1; i > 0; i--){
        for (j = 1; j <= 2*(n-i); j++){
            printf(" ");
        }
        for (j = 0; j < (2*i-1); j++){
            printf("%c ", 65 + 2*j);
        }
        printf("\n");
    }
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/FCP/"tempCodeRunnerFile
Enter the length - 5
      A
     A C E
    A C E G I
   A C E G I K M
  A C E G I K M O Q
 A C E G I K M
A C E G I
 A C E
  A

garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/FCP/"tempCodeRunnerFile
Enter the length - 3
  A
 A C E
A C E G I
 A C E
  A
```

3. Write a program to do the following task

a) Accept any 2 positive numbers, say n1 and n2. Assume $n1 > n2$.

b) Print all even numbers that lie between n1 and n2.

c) Print the total number of even numbers between n1 and n2

```
//Q3
#include <stdio.h>
int main(){
    int total = 0, i, n1, n2;
    printf("Enter two numbers - \n");
    scanf("%d", &n1);
    scanf("%d", &n2);
    for (i = n1; i<=n2; i++){
        if (i%2 == 0){
            printf("%d\n", i);
            total += 1;
        }
    }
    printf("Total Even Numbers are - %d", total);
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/g
llege/FCP/"tempCodeRunnerFile
Enter two numbers -
4 21
4
6
8
10
12
14
16
18
20
Total Even Numbers are - 9
```

4. Write a program to calculate the sum of the square of each digit of the given number. [E.G. $4534 \rightarrow 4^2 + 5^2 + 3^2 + 4^2 = 66$]

```
//Q4
#include <stdio.h>
int main(){
    int n, sum=0;
    printf("Enter the number - ");
    scanf("%d", &n);
    while(n>0){
        sum += (n%10)*(n%10);
        n = n/10;
    }
    printf("Sum of Square is %d", sum);
}
```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop"
ssignment-4
Enter the number - 1111
Sum of Square is 4
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop"
ssignment-4
Enter the number - 1023
Sum of Square is 14
```

5. Accept 2 four-digit positive integers then calculate and display the sum of the product of each pair of digits occupying the same position in the two numbers. [E.G. if the first number is 3445 and the second number is 4534 then the output will be 64.]

(Example: $3 * 4 + 4 * 5 + 4 * 3 + 5 * 4 = 64$)

```
//Q5
#include <stdio.h>
int main(){
    int n1, n2, sum= 0;
    printf("Enter two numbers - ");
    scanf("%d", &n1);
    scanf("%d", &n2);
    while ((n1>0) && (n2>0)){
        sum += (n1%10)*(n2%10);
    }
}
```

```

        n1 = n1/10;
        n2 = n2/10;
    }
    printf("The sum is %d", sum);
}

```

```

garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/College/FCP/
llege/FCP/"tempCodeRunnerFile
Enter two numbers - 2343 6546
The sum is 61

```

Competitive problem.

6. Given two integers L and R where $L \leq R$, the task is to find an integer K such that: $L \leq K \leq R$. All the digits of K are distinct.

The value of the expression $(L - K) * (K - R)$ is maximum. If multiple answers exist then choose the larger value for K .

```

//Q6
#include <stdio.h>
int distinct(int);

int main(){
    int L, R, P, l, r;
    printf("Enter two numbers - \n1st - ");
    scanf("%d", &L);
    printf("2nd - ");
    scanf("%d", &R);

    P = (L+R)/2;
    l = P;
    r = P;
    if (distinct(P) == 1){
        printf("Answer is %d", P);
    }
    else{
        while ((l!=L) && (r!=R)){
            if (distinct(l) == 1){
                printf("Answer is %d\n", l);
                break;
            }
            else{

```

```

        l -= 1;
    }
    if (distinct(r) == 1){
        printf("Answer is %d", r);
        break;
    }
    else{
        r += 1;
    }
}
if ((r == R) && (l == L)){
    printf("Answer does not EXIST !");
}
}
}

```

```

int distinct(int n){
    int a, m, i, x;
    m = n;
    while (n>0){
        i = n%10;
        a = m;
        x = 0;
        while(a>0){
            if (i == (a%10)){
                x +=1;
            }
            if (x >1){
                x = -1;    // x = -1 for non-distinct
                break;
            }
            a = a/10;
        }
        n = n/10;
    }
    return x;
}

```

```

garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/Co
ssignment-4
Enter two numbers -
1st - 100
2nd - 132
Answer is RIGHT 120
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/Co
ssignment-4
Enter two numbers -
1st - 123
2nd - 345
Answer is 234

```

7. Count of triples (A, B, C) where $A * C$ is greater than $B * B$

Given three integers A, B and C. The task is to count the number of triples (a, b, c) such that $a * c > b^2$, where $0 < a \leq A$, $0 < b \leq B$ and $0 < c \leq C$.

```

//Q7
#include <stdio.h>
int main(){
    int A, B, C, a, b, c, pairs=0;
    scanf("%d %d %d", &A, &B, &C);
    if (A*C <= B*B){
        printf("Invalid Input !");
    }
    else{
        for (b = 0; b<=B; b++){
            for (a = 0; a<=A; a++){
                for (c = 0; c <= C; c++){
                    if ((a*c) > (b*b)){
                        pairs += 1;
                    }
                }
            }
        }
        printf("No. of ordered triplets are - %d", pairs);
    }
}

```

```
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/College/FCP/" &
ssignment-4
2 4 6
Invalid Input !
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/College/FCP/" &
ssignment-4
1 3 5
Invalid Input !
garvitshah@Garvits-MacBook-Air ~/D/C/FCP> cd "/Users/garvitshah/Desktop/College/FCP/" &
ssignment-4
3 4 6
No. of ordered triplets are - 52
```