Lecture - 19

- DPP on Loops

Programming in C

Q. HCF & LCM Calculation of 2 numbers.

HCF ⟶ A number that is a multiple of both numbers

(GCD)

↳ User gives 2 two i/ps $\begin{matrix} a \\ b \end{matrix}$

↳ if (a < b) : $i \rightarrow a$

↳ [c = a]

↳ [1 ⟶ a]

[x is smallest of a & b]

else

↳ 1 ⟶ b $i \rightarrow b$

[x = b]

↳ check [a % i == 0 && b % i == 0]

↳ (HCF) 'i' will be HCF

$$LCM = \frac{a * b}{HCF}$$

$$a * b = LCM \times HCF$$

HCFandLCM.c

DPP Conditional > DPP Loops > HCFandLCM.c > main()

```c
#include<stdio.h>
int main(){
    int a, b, x, hcf;
    printf("Enter the first number: \n");
    scanf("%d", &a);
    printf("Enter the Second number: \n");
    scanf("%d", &b);
    if (a<b){
        x = a;
    }
    else{
        x = b;
    }
    for (int i = 1; i<=x; i++){
        if ((a%i==0) && (b%i==0)){
            hcf = i;
        }
    }
    printf("The HCF of %d and %d is %d\n", a, b, hcf);
    int lcm = (a*b)/hcf;
    printf("The LCM of %d and %d is %d\n", a, b, lcm);

    return 0;
}
```

hcf = a x b

int hcf = a x b;

minimum of a & b

x

1 → min(a, b)

1 → x

i = 1, 2, 3, ... x

a%i == 0 R , b%i == 0 R } HCF = i

Update

lcm = (a x b) / HCF

Q WAP to Calculate the factorial of a number using loop :

Factorial Notation (!) ⟵ multiply the numbers in reverse order from 'n'

fact = 1

$5! = 5 \times 4 \times 3 \times 2 \times 1$

$4! = 4 \times 3 \times 2 \times 1$

$3! = 3 \times 2 \times 1$

$2! = 2 \times 1$

$1! = 1$

$0! = 1$

input → 0 or 1

↳ (1)

unsigned int

$\therefore n! = (n) \times (n-1) \times (n-2) \times (n-3) \ldots 3 \times 2 \times 1$

OR

$n! = 1 \times 2 \times 3 \times 4 \ldots n$

Algo:

n = input ( )

loop → 1 → n ← included

i →

fact *= i

fact = fact x i

⇒ Print (fact)

HCFandLCM.c | factorial.c

DPP Conditional > DPP Loops > factorial.c > main()

```c
#include<stdio.h>

int main(){
    unsigned int n;
    long long int factorial = 1 ;
    printf("Enter number: \n");
    scanf("%d", &n);
    if (n == 0 || n == 1){
        printf("The factorial is: 1\n");
    }
    else{
        for (int i = 1; i<=n; i++){
            factorial *= i;
        }
        printf("The factorial of %d is %d", n, factorial);
    }
    return 0;
}
```

n ← input (5) factorial = ~~1~~ ~~1~~ ~~2~~ ~~6~~ ~~24~~ 120

if (n==0 or n==1) (X)

Else:

i → i=1

1 → n

5

factorial *= i

factorial = factorial x i

fact. = 1 x 1

i = 2,

factorial *= i

factorial = 1 x 2

factorial = 2

i = 3,

factorial *= i

fact = 2 x 3

fact = 6

i = 4,

fact *= i

fact = 6 * 4

fact = 24

i = 5,

fact *= i

fact = 24 * 5

fact = 120

Print

WAP to Print the following Pattern

n = 5

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

for 1st row
↳ 5 Star (n)

for 2nd row
↳ 4 Star (n-1)

for 3rd row
↳ 3 Star (n-2)

⋮

(n-3)

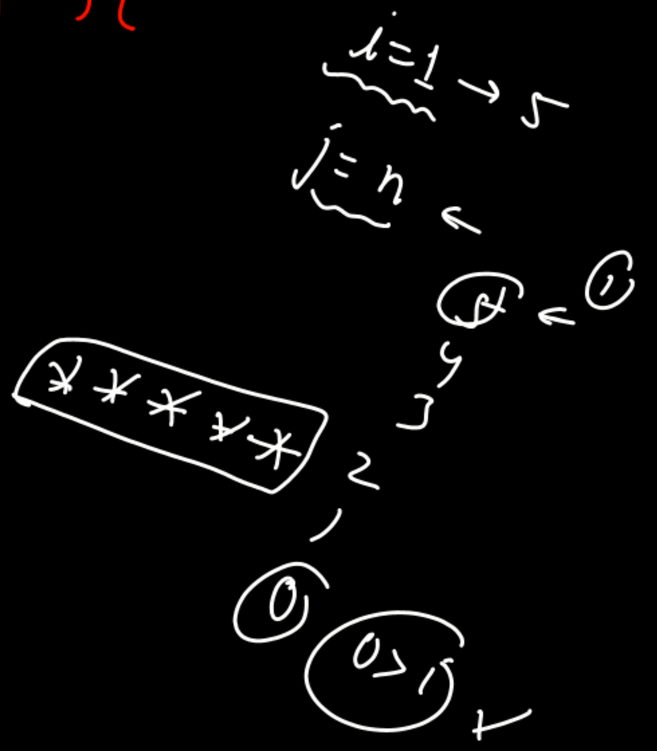
(n-(n-1))

Rows = 5

outer loop (i : 1 → 5)
↳ inner loop (j : n → 1)

n = 5

```
for ( int i = 1 ; i <= n ; i++ ) {
    for ( int j = n , j >= i ; j-- ) {
        print('*') ;
    }
    print("\n")
```



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HCFandLCM.c | factorial.c | reversepattern.c

DPP Conditional > DPP Loops > reversepattern.c > main()

```c
#include<stdio.h>

int main(){
    int n;
    printf("Enter the number of rows you want to print: \
    scanf("%d", &n);
    for (int i = 1; i<=n; i++){
        for (int j = n; j >=i; j--){
            printf("* ");
        }
        printf("\n");
    }
    return 0;
}
```

```
Enter the number of rows you want to print:
10
* * * * * * * * * * \n
* * * * * * * * * \n
* * * * * * * * \n
* * * * * * *
* * * * * *
* * * * *
* * * *
* * *
* *
*
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PP Loops>
```

for (i : 1 → n)
↳ for (j : n → i)
↳ "*"
printf("\n")

WAP : Similar

1 5 4 3 2 1

2 5 4 3 2

3 5 4 3

4 5 4

5 5

n=5

```
for ( int i=1; i<=n; i++){
    for ( int j=n, j>=i ; j--) {
        print( j);

    print( "\n")
```

HCFandLCM.c | factorial.c | reversepattern.c | reversenumberpattern.c

DPP Conditional > DPP Loops > reversenumberpattern.c > main()

```c
#include<stdio.h>

int main(){
    int n;
    printf("Enter the number of rows you want to
    print: \n");
    scanf("%d", &n);
    for (int i = 1; i<=n; i++){
        for (int j = n; j >=i; j--){
            printf("%d ",j);
        }
        printf("\n");
    }
    return 0;
}
```

```
Enter the number of rows yo
10
10 9 8 7 6 5 4 3 2 1
10 9 8 7 6 5 4 3 2
10 9 8 7 6 5 4 3
10 9 8 7 6 5 4
10 9 8 7 6 5
10 9 8 7 6
10 9 8 7
10 9 8
10 9
10
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```

WAP to Print: $f(x) = x^1, x^2, x^3, x^4 \ldots x^n$, <math.h>

$x, n \leftarrow$ input, $[x, n \in \mathbb{Z}^+]$

math
↳ pow(x, n)

loop $\Rightarrow \begin{bmatrix} i \\ 1 \rightarrow n \end{bmatrix}$

$x^i, x^{i+1}, x^{i++} \ldots x^n$

```
for (int i = 1, i<= n ; i++) {
    printf("%d ", pow(x, i)) ;
```

factorial.c | reversepattern.c | reversenumberpattern.c | seriesGP.c

onditional > DPP Loops > seriesGP.c > main()

```c
#include<stdio.h>
#include<math.h>
int main(){
    int x, n;
    printf("Enter the value of x: \n");
    scanf("%d", &x);
    printf("Enter the value of n: \n");
    scanf("%d", &n);
    for (int i = 1; i<=n; i++){
        printf("%d ", (int) pow(x, i));
    }
    return 0;
}
```

```
Enter the value of x:
2
Enter the value of n:
10
2 4 8 16 32 64 128 256 512 1024
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```

Maths

x = 1.5 h

float int ⇐ float

x = 1.5 e

double double = double

int =

type cast to int

<math.h>
↳ pow( )
sqrt( ) } double

2 + 4 + 6 + 8 + 10 ..... (10000) ← terms

100 000 000

loop

n = 2 , t = 10000

```
for(int i = 2; i<=10000; i=i+2)
    t += 2
}
printf("%d", n);
```

Math

A.P

$$S_n = \frac{n}{2}(a + a_n)$$

$$S_n = \frac{n}{2}(a + a + (n-1)d)$$

$$S_n = \frac{n}{2}(2a + (n-1)d)$$ ✓

Expression Solve