

DAY 12

07 May 2024 01:03 PM

Array

Add a new element in a sorted Array -



```
for(i=n-1; i>=0 && a[i]>no; i--)  
{  
    a[i+1] = a[i];  
}  
{ a[i+1] = no;  
n++; }
```

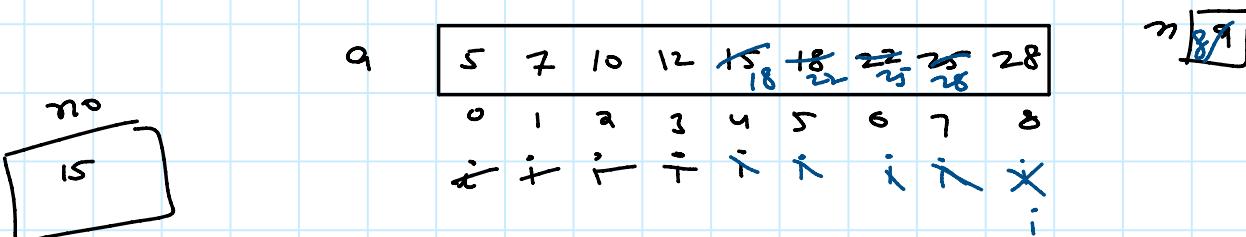
```
#include<iostream>  
using namespace std;  
int main()  
{  
    int a[10]={1,5,9,12,16,18,25};  
    int n=7;  
    int no=30;  
    int i;  
  
    //output  
    for(i=0;i<n;i++)  
    {  
        cout<<a[i]<<" ";  
    }  
    cout<<endl;  
    //insert a new element in the array  
    for(i=n-1;i>=0 and a[i]>no;i--)  
    {
```

```

        a[i+1]=a[i];
    }
    a[i+1]=no;
    n++;
    //output
    for(i=0;i<n;i++)
    {
        cout<<a[i]<<" ";
    }
    cout<<endl;
}

```

w.A.P to delete an element from sorted Array



```

for(i=0; i<n; i++)
{
    if(a[i] == no)
    {
        for( ; i<n-1; i++)
        {
            a[i] = a[i+1];
        }
        n--;
    }
}

```

```

#include<iostream>
using namespace std;
int main()
{
    int a[10]={1,5,9,12,16,18,25};
    int n=7;
    int no=30;
    int i;

    //output

```

```

for(i=0;i<n;i++)
{
    cout<<a[i]<<" ";
}
cout<<endl;
//insert a new element in the array
for(i=n-1;i>=0 and a[i]>no;i--)
{
    a[i+1]=a[i];
}
a[i+1]=no;
n++;
//output
for(i=0;i<n;i++)
{
    cout<<a[i]<<" ";
}
cout<<endl;
no=16;
for(i=0;i<n;i++)
{
    if(a[i]==no)
    {
        while(i<n-1){
            a[i]=a[i+1];
            i++;
        }
        n--;
    }
}
//output
for(i=0;i<n;i++)
{
    cout<<a[i]<<" ";
}
cout<<endl;
}

```

merge two sorted Array

$n \boxed{5}$

a	1	3	4	8	10
	0	1	2	3	4
	i	i	i	i	i

$m \boxed{6}$

b	2	5	12	15	18	25
	0	1	2	3	4	5
	j	j	j	j	j	j

$n+m \boxed{11}$

c	1	2	3	4	5	8	10	12	15	18	25
	-	.	2	7	11	-	6	7	8	9	10

c	1	2	3	4	5	8	10	12	15	18	25
	0	1	2	3	4	5	6	7	8	9	10
	K	K	K	K	K	K	K	K	K	K	K

①

```

int i,j,k;
for(i=j=k=0; i<n && j<m; k++)
{
    if(a[i] < b[j])
    {
        c[k] = a[i];
        i++;
    }
    else
    {
        c[k] = b[j];
        j++;
    }
}

```

②

```

while (i<n)
{
    c[k] = a[i];
    i++;
    k++;
}

```

③

```

while (j<m)
{
    c[k] = b[j];
    j++;
    k++;
}

```

```

#include<iostream>
using namespace std;
int main()
{
    int a[5]={1,5,9,12,15};
    int b[6]={2,5,10,18,25};
    int n=5;
    int m=6;
    int c[11];
    int i,j,k;
    for(i=j=k=0;i<n and j<m ; k++)
    {
        if(a[i]<b[j])
        {

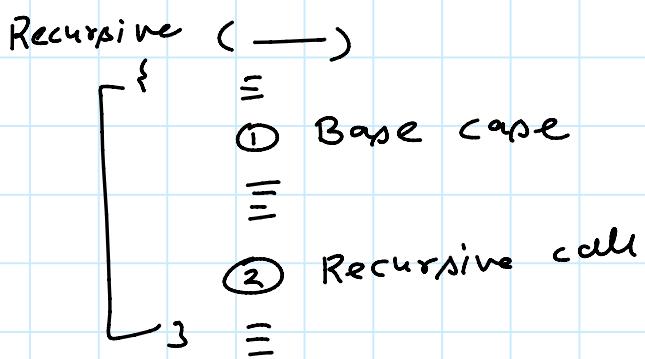
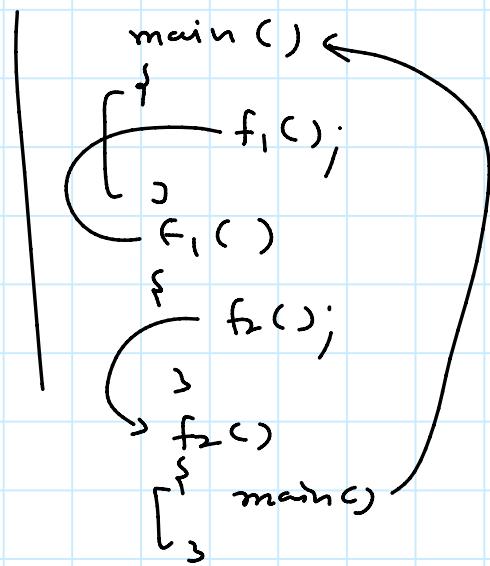
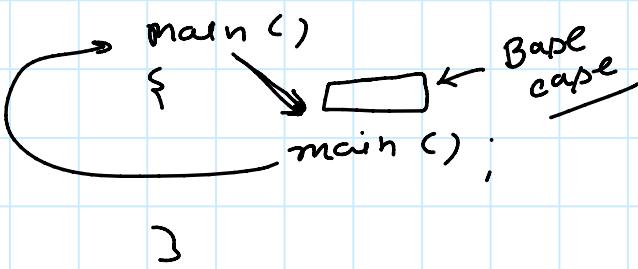
```

```

        c[k]=a[i];
        i++;
    }
    else
    {
        c[k]=b[j];
        j++;
    }
}
while(i<n)
{
    c[k]=a[i];
    k++;
    i++;
}
while(j<m)
{
    c[k]=b[j];
    k++;
    j++;
}
//output
for(i=0;i<n+m;i++)
    cout<<c[i]<<" ";
}

```

Recursive function :-



L₃ ≡

$$5! = 5 * 4 * 3 * 2 * 1 \rightarrow 120$$

or
 $5! = 5 * 4 * 3 * 2 * 1$

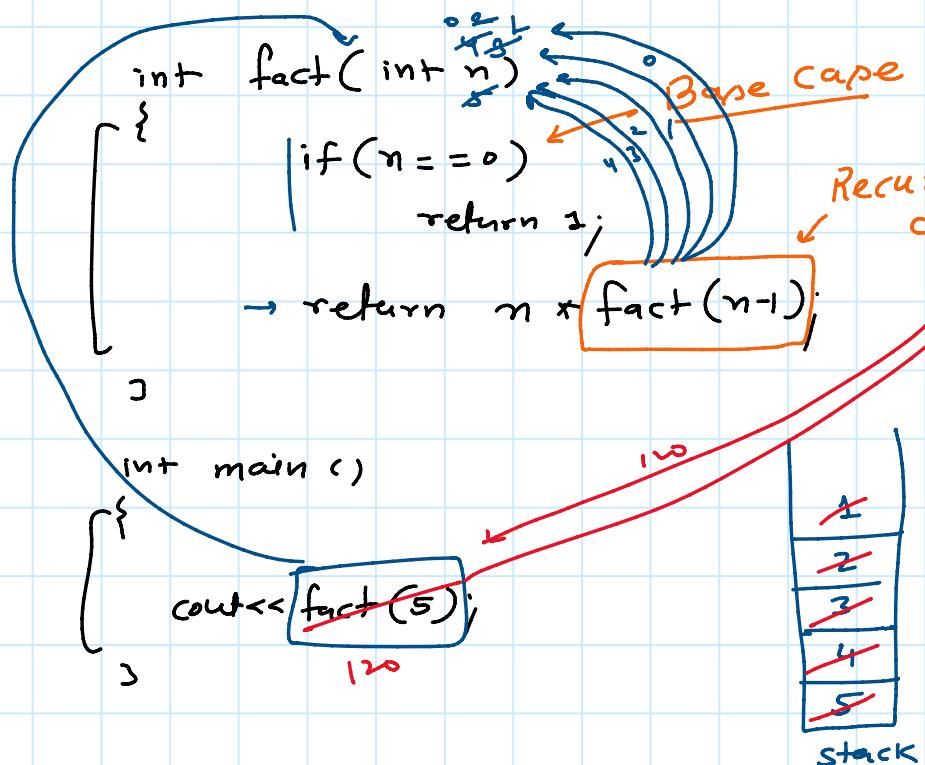
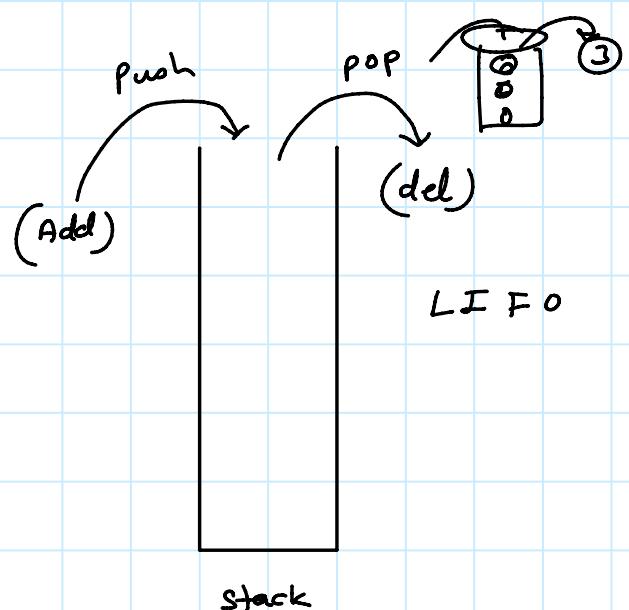
$$4! = 4 * 3! \quad 6$$

$$3! = 3 * 2! \quad 2$$

$$2! = 2 * 1! \quad 1$$

$$1! = 1 * 0! \quad 1$$

$$0! = 1$$



fact(5)
~~5 * fact(4)~~
~~4 * fact(3)~~
~~3 * fact(2)~~
~~2 * fact(1)~~
~~1 * fact(0)~~
1

```
#include<iostream>
using namespace std;
int fact(int n)
{
```

```

if(n==0)
    return 1;
return n * fact(n-1);
}
int main()
{
    int a;
    cout<<"Enter a number:" ;
    cin>>a;
    cout<<fact(a);
}

```

w.A.R. F to calculate power of a no .

$$\begin{array}{ccc}
 n & \boxed{5} & p & \boxed{3} \\
 n^p & 5^3 & &
 \end{array}$$

$$\begin{aligned}
 5^3 &\rightarrow 5 \times \boxed{5 \times 5} \\
 &\text{or} \\
 \cancel{\boxed{5^1}} &= 5 \times \cancel{\boxed{5^2}} \quad \cancel{5^2} \\
 5^2 &= 5 \times 5^1 \\
 5^1 &= 5 \times 5^0 \\
 5^0 &= 1 \quad \text{base case}
 \end{aligned}$$

```

#include<iostream>
using namespace std;
int power(int n, int p)
{
    if(p==0)
        return 1;
    return n * power(n,p-1);
}
int main()
{
    int a,b;
    cout<<"Enter a number and its power:" ;
    cin>>a>>b;
    cout<<power(a,b);
}

```

w.A.R.F to multiply 2 nos without using * operator

$$a\square \rightarrow b\square$$

$$\begin{aligned} (5, 4) &\rightarrow 5 + \boxed{5+5+5} \\ \text{or} \\ (5, 4) &\rightarrow 5 + \cancel{(5, 3)}^{\cancel{a} \cancel{b-1}} 15 \\ (5, 3) &\rightarrow 5 + \cancel{(5, 2)}^{\cancel{10}} 10 \\ (5, 2) &\rightarrow 5 + \cancel{(5, 1)}^{\cancel{5}} 5 \\ (5, 1) &\rightarrow 5 + \cancel{(5, 0)}^{\cancel{0}} 0 \\ (5, 0) &\rightarrow \boxed{0} \end{aligned}$$

$$\boxed{20}$$

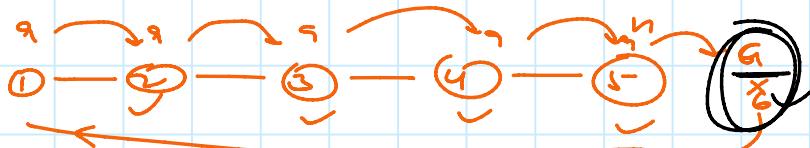
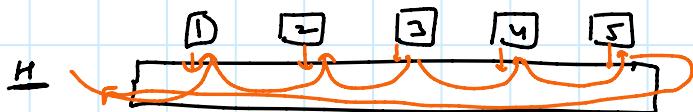
$$5+5+5+5 = 20$$

$$4+4+4+4+4 = 20$$

```
#include<iostream>
using namespace std;
int mult(int a, int b)
{
    if(b==1)
        return a;
    return a + mult(a,b-1);
}
int main()
{
    int a,b;
    cout<<"Enter 2 nos:";
    cin>>a>>b;
    cout<<mult(a,b);
}
```

w.A.R.F to print 1, 2, 3, ... n





break
 + loop
 + switch

```
void series (int a, int n)
{
    if (a > n)
        return;
    cout << a;
    series(a+1, n);
}
```

series(1, n);



```
#include<iostream>
using namespace std;
void series(int a, int n)
{
    if(a>n)
        return;
    cout << a << " ";
    series(a+1, n);
}
int main()
{
```

```

    series(1,10);
}

```

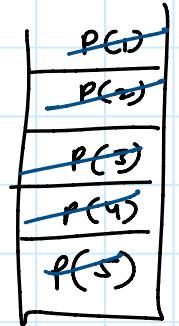
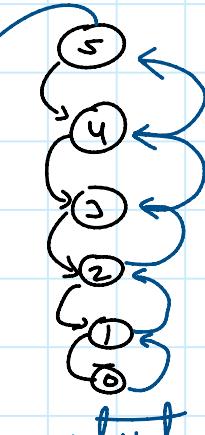


1 2 3 4 5

```

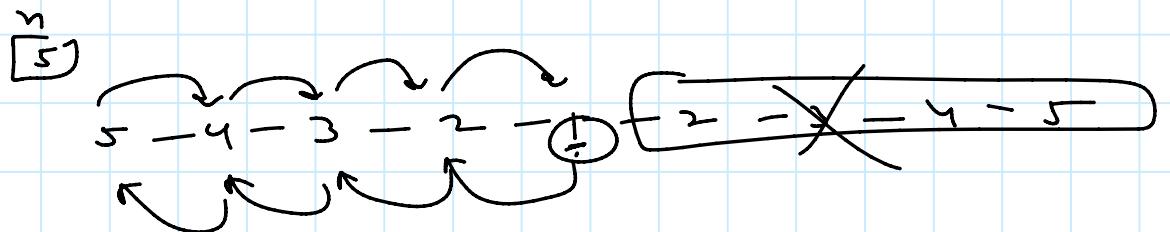
#include<iostream>
using namespace std;
void series(int n)
{
    if(n==0)
        return;
    series(n-1);
    cout<<n<<" ";
}
int main()
{
    series(10);
}

```



1 3 3 4 5

W.A.R.F to print $n \dots 3, 2, 1, 2, 3 \dots n$



```

void series (int n)
{
    ...
}

```

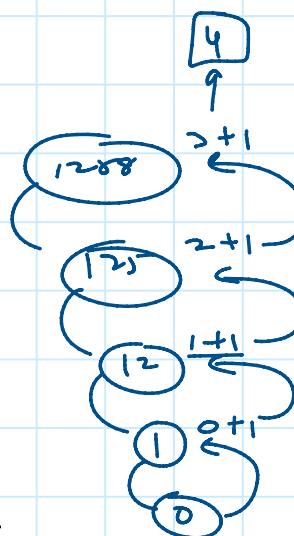
```
void series( int n ) {  
    if ( n == -1 )  
        cout << n;  
    else  
        return;  
  
    cout << n; ←  
    series( n-1 );  
    cout << n; ←
```

```
#include<iostream>
using namespace std;
void series(int n)
{
    if(n==1){
        cout<<n<<" ";
        return;
    }
    cout<<n<<" ";
    series(n-1);
    cout<<n<<" ";
}
int main()
{
    series(5);
}
```

W.A.R.F to count no of digits

n | 1258

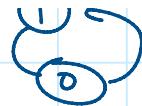
```
int countDigit (int n) {  
    if (n == 0)  
        return 0;  
    else  
        return 1 + countDigit (n / 10);  
}
```



```

    return 0;
)
return 1 + countDigit(n/10);

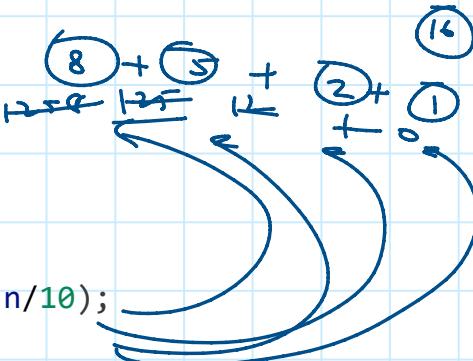
```



```

#include<iostream>
using namespace std;
int countdigit(int n)
{
    if(n==0){
        return 0;
    }
    return 1+countdigit(n/10);
}
int main()
{
    cout<<countdigit(125855);
}

```



W.A.R.F to calculate sum of digits of a no

$$n \boxed{1258} \rightarrow 1+2+5+8 \rightarrow \boxed{16}$$

```

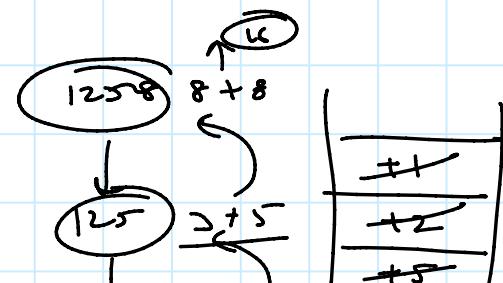
int sumOfDigits (int n)
{
    if(n==0)
        return 0;
    return n%10 + sumOfDigits (n/10)
}

```

```

#include<iostream>
using namespace std;
int sumOfDigit(int n)
{
    if(n==0){
        return 0;
    }
    return n%10 + sumOfDigit(n/10);
}

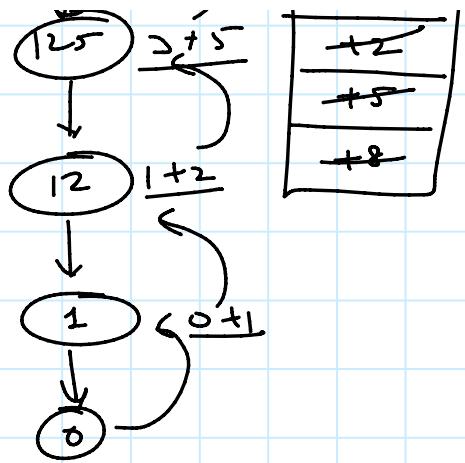
```



```

    {
        return 0;
    }
    return n%10 + sumOfDigit(n/10);
}
int main()
{
    cout<<sumOfDigit(1258);
}

```



W.A.R. F to Reverse a no

$$n \boxed{125} \rightarrow \text{Rev } \boxed{521}$$