

ព្រះរាជាណាចក្រកម្ពុជា  
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Institute of technology of Cambodia

Department of Information and communication Engineering



The lesson taking about using recursive function in c++

TP13 Recursive function

TP: Algorithm and Programming II

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## Problem1:

A C++ program that can perform various mathematic operations below. Solve each operation using recursive operation.a

.A power function to calculate  $m^n$ . It is multiply m for n times ( $m * m * \dots * m$ ) int

power(int m, int n)

b. A function to calculate sum of square of first n integer  $1^2 + 2^2 + \dots + n^2$ . int

sumSquare(int n)

c. Sum the digits of a number. int sumDigit(int n)

start here X Pro1 TP13 venthon,e20191250.cpp X

```
1  #include<iostream>
2  using namespace std;
3  int powerfunction(int m, int n)
4  {
5      int power=m;
6      int i=1;
7      while(i<n)
8      {
9          power=power*m;
10         i++;
11     }
12     return power;
13 }
14 int sumOfsquare(int k)
15 {
16     int sum=0;
17     for(int i=1; i<=k; i++)
18     {
19         sum+=(i*i);
20     }
21     return sum;
22 }
23 int sumofdigit(int f)
24 {
25     int tmp=0;
26     while(f>0)
27     {
28         tmp+=f%10;
29         f/=10;
30     }
31     return tmp;
32 }
```

```

33  main()
34  {
35      int k,l,p;
36      cout<<"\n\tEnter number k: ";cin>>k;
37      cout<<"\n\tEnter number l: ";cin>>l;
38      cout<<"\n\t==> Results of power is: "<<powerfunction(k, l)<<endl;
39      cout<<"\n\tEnter number p: ";cin>>p;
40      cout<<"\n\t==> Results of sum square is: "<<sumOfsquare( p)<<endl;
41      cout<<"\n\tEnter of number p: ";cin>>p;
42      cout<<"\n\t==> Summation of digit number is: "<<sumofdigit(p)<<endl;
43  }
44

```

```

Enter number k: 4

Enter number l: 4

==> Results of power is: 256

Enter number p: 5

==> Results of sum square is: 55

Enter of number p: 123456

==> Summation of digit number is: 21

```

```

Process returned 0 (0x0)   execution time : 24.670 s
Press any key to continue.

```

## Problem2:

A C++ Program that can do some operations below. (make a menu for your program so that users can test any functions. Run it as infinite loop). Solve each operation using recursive operation.

a. A function to display n star (\*) void displayStar(int n)

b. Display numbers from n to 1 void displayNumbers(int n)

```
rt here X Pro1 TP13 venthon,e20191250.cpp X Pro2 TP13 venthon,e20191250.cpp X
1  #include<iostream>
2  using namespace std;
3  void displayNstar(int n)
4  {
5      if(n==0)
6      {
7          cout<<" ";
8      }
9      else
10     {
11         cout<<"\t* ";
12         displayNstar(n-1);
13     }
14 }
15 void displayNumberNto1(int n)
16 {
17     if(n==1)
18     {
19         cout<<"\t "<<n;
20     }
21     else
22     {
23         cout<<"\t "<<n;
24         displayNumberNto1(n-1);
25     }
26 }
27
28
```

```

29  main()
30  {
31      int n;
32      cout<<"\n\tEnter n: ";
33      cin>>n;
34      cout<<"\n\tDisplay N star:"<<endl;
35      displayNstar(n);
36      cout<<"\n\tEnter n: ";
37      cin>>n;
38      cout<<"\n\tDiplay number N to 1 is:"<<endl;
39      displayNumberNto1(n);
40
41  }
42

```

 "C:\Users\Admin\Desktop\code c++\TP13C++\Pro2 TP13 venthon,e20191250.exe"

```

Enter n: 6

Display N star:
*      *      *      *      *      *

Enter n: 10

Diplay number N to 1 is:
10      9      8      7      6      5      4      3      2      1
Process returned 0 (0x0)   execution time : 15.435 s
Press any key to continue.

```

### Problem3:

Write a recursive function to find multiplication of all elements in an array, where the array and its size are passed as parameters of function. `int multiplyArrayElement(int a[], int size)`

```
rt here X Pro1 TP13 venthon,e20191250.cpp X Pro2 TP13 venthon,e20191250.cpp X Pro3 TP13 venthon,e20191250.cpp X
1
2 #include<iostream>
3 using namespace std;
4 int MultiplicationArrayElement(int array[], int size)
5 {
6     if(size<=0)
7     {
8         return 0;
9     }
10    else if(size==1)
11    {
12        return array[0];
13    }
14    else
15    {
16        return array[size - 1]*MultiplicationArrayElement(array, size-1);
17    }
18 }
19
20
21 int main()
22 {
23     int myArray[6]={1,2,3,4,5,6};
24     cout<<"\n\t The multiplication is: "<<MultiplicationArrayElement(myArray, 6)<<endl;
25 }
26
27
```

 "C:\Users\Admin\Desktop\code c++\TP13C++\Pro3 TP13 venthon,e20191250.exe"

```
The multiplication is: 720
Process returned 0 (0x0)   execution time : 0.026 s
Press any key to continue.
```

## Problem4:

Write a recursive function that finds and returns the minimum element in an array, where the array and its size are given as parameters

.int findMin(int a[], int n)

here x Pro1 TP13 venthon,e20191250.cpp x Pro2 TP13 venthon,e20191250.cpp x Pro3 TP13 venthon,e20191250.cpp x Pro4 TP13 venth

```
1  #include<iostream>
2  using namespace std;
3  int findminOfNumber(int a[],int n)
4  {
5      int min;
6      if(n==1)
7      {
8          min=a[0];
9          return min;
10     }
11     else
12     {
13         return min=a[n]<findminOfNumber(a,n-1)?a[n]:findminOfNumber(a,n-1);
14     }
15 }
16 int main()
17 {
18     int Array[]={10,20,-10,33,44,60,70,-80};
19     int length=sizeof(Array)/sizeof(Array[0]);
20     cout<<"\n\t the minimum of number is: "<<findminOfNumber(Array,length)<<endl;
21 }
22
```

"C:\Users\Admin\Desktop\code c++\TP13C++\Pro4 TP13 venthon,e20191250.exe"

the minimum of number is: -80

Process returned 0 (0x0) execution time : 0.029 s  
Press any key to continue.



## Problem5:

Write a recursive function that computes and returns the sum of all elements in an array, where the array and its size are given as parameters. `int findsum(int a[], int n)`

```
art here x Pro4 TP13 venthon,e20191250.cpp x Pro5 TP13 venthon,e20191250.cpp x
1  #include<iostream>
2  using namespace std;
3  int SumElementOfArray(int a[],int n)
4  {
5      int sum=0;
6      for(int i=0; i<n; i++)
7      {
8          sum=sum+a[i];
9      }
10     return sum;
11 }
12 main()
13 {
14     int num[5]= {1,2,3,4,5};
15     cout<<"\n\tSummation of all element number is: "<<SumElementOfArray(num,5)<<endl;
16 }
17
```

 "C:\Users\Admin\Desktop\code c++\TP13C++\Pro5 TP13 venthon,e20191250.exe"

```
Summation of all element number is: 15
Process returned 0 (0x0)   execution time : 0.029 s
Press any key to continue.
```