



Recursion

1. Write a C program that has a function that **iteratively** computes and returns the sum of the first n integers 1, 2, ... n.

Sample Run:

Enter n: 5

Sum of numbers from 1 to 5 is 15

2. Write a C program that has a function that **recursively** computes and returns the sum of the first n integers 1, 2, ... n. The sum of a series of consecutive numbers from 1 to n can be represented as follows:

$\text{sum}(1) = 1$

$\text{sum}(n) = n + \text{sum}(n-1)$

Sample Run:

Enter n: 5

Sum of numbers from 1 to 5 is 15

3. Write a C program that has a function that **iteratively** computes and returns the factorial function n!.

Sample Run:

Enter n: 4

4! is 24

4. Write a C program that has a function that **recursively** computes and returns the factorial function n!.

Sample Run:

Enter n: 4

4! is 24

5. The Fibonacci series 0, 1, 1, 2, 3, 5, 8, 13, 21... begins with 0 and 1. It has the property that each subsequent Fibonacci number is the sum of the previous two Fibonacci numbers, That is Fibonacci series is defined by the equation:

$$F_n = F_{n-1} + F_{n-2}$$

Write a C program that has a function that recursively computes and returns the nth Fibonacci number.

Sample Run:

Enter n: 3

Third Fibonacci number is 2

6. Show the output of the following programs:

a. `#include<stdio.h>`

`int z;`

`void f(int x)`

```

{ x=2; z+=x; }
int main(void)
{ z=5;
  f(z);
  printf("z=%d\n",z);
  int x=10;
  f(x);
  printf("x=%d\n",x);
  return 0;
}

```

b. #include<stdio.h>

```

int main(void)
{ int a=1, b=2, c=3;
  a+=b+=++c;
  printf("%5d%5d%5d\n", a, b, c);
  { float b = 4.0;
    int c;
    a+=c=5*b;
    printf("%5d%5.1f%5d\n",a,b,c);
  }
  printf("%5d%5d%5d\n", a, b, c);
  return 0;
}

```

c. Show what would be the output when a is entered as 20 and b as 12:

```

#include<stdio.h>
int mystry(int, int);
int main(void)
{ int a,b;
  printf("Please enter a and b values\n");
  scanf("%d %d",&a,&b);
  printf("result=%d",mystry(a,b));
  return 0;
}
int mystry(int p, int q)
{ int r;
  if((r=p%q)==0)
    return q;
  else
    return mystry(q,r);
}

```