

ASSIGNMENT 6(8.08.2025)

1. Write a function to find the factorial of a number.

Input: An integer n

Process: Multiply numbers from 1 to n $\rightarrow n! = 1 \times 2 \times 3 \times \dots \times n$

Output: Factorial of n

CODE:

```
#include <stdio.h>

int factorial(int n)
{
    int fact = 1;
    for(int i = 1; i <= n; i++)
        fact *= i;
    return fact;
}

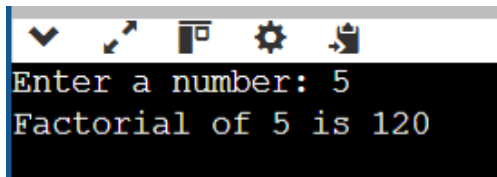
int main()
{
    int num;

    printf("Enter a number: ");
    scanf("%d", &num);

    printf("Factorial of %d is %d\n", num, factorial(num));

    return 0;
}
```

OUTPUT:



```
Enter a number: 5
Factorial of 5 is 120
```

2. Write a function to check whether a number is

prime Input: An integer n

Process: Check if n is divisible by any number from 2 to $n/2$

Output: Prime or not prime message

CODE:

```
#include <stdio.h>

#include <stdbool.h>

bool isPrime(int n)
{
    if(n < 2) return false;

    for(int i = 2; i <= n/2; i++)
        if(n % i == 0)
            return false;

    return true;
}

int main()
{
    int num;
```

```

printf("Enter a number: ");

scanf("%d", &num);

if(isPrime(num))

    printf("%d is a prime number\n", num);

else

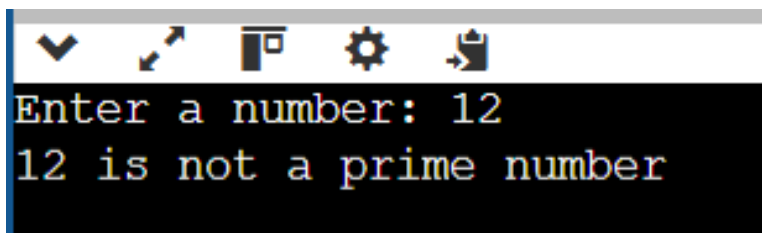
    printf("%d is not a prime number\n", num);

return 0;

}

```

OUTPUT:



```

Enter a number: 12
12 is not a prime number

```

3. Write a function to calculate power using recursion.

Input: Base b, Exponent e

Process: Recursive multiplication $\rightarrow b^e = b \times b \times \dots \times b$ (e times)

Output: Result of b^e

CODE:

```

#include <stdio.h>

int power(int base, int exp)

```

```

{
    if(exp == 0)
        return 1;
    return base * power(base, exp - 1);
}

int main()
{
    int base, exp;

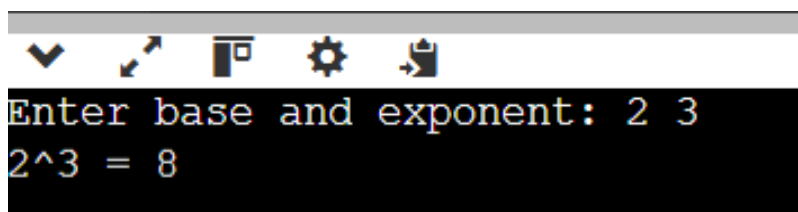
    printf("Enter base and exponent: ");
    scanf("%d %d", &base, &exp);

    printf("%d^%d = %d\n", base, exp, power(base, exp));

    return 0;
}

```

OUTPUT:



```

Enter base and exponent: 2 3
2^3 = 8

```

4. Write a function to check palindrome number using recursion.

Input: An integer n

Process: Reverse the number using recursion and compare with original

Output: Whether the number is a palindrome

CODE:

```
#include <stdio.h>

int reverse(int num, int rev)

{
    if(num == 0)

        return rev;

    return reverse(num / 10, rev * 10 + num % 10);
}

int main()

{
    int num, rev;

    printf("Enter a number: ");

    scanf("%d", &num);

    rev = reverse(num, 0);

    if(num == rev)

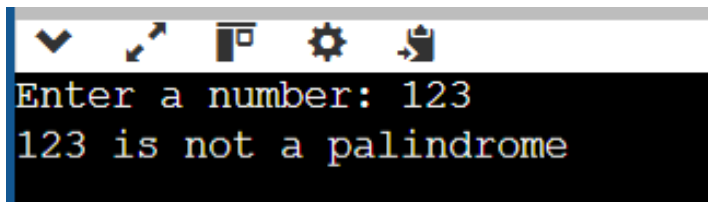
        printf("%d is a palindrome\n", num);

    else

        printf("%d is not a palindrome\n", num);

    return 0;
}
```

OUTPUT:



```
Enter a number: 123
123 is not a palindrome
```

5. Write a function to calculate nCr (combinations).

Input: Two integers n and r

Process: Compute using formula $\rightarrow nCr = \frac{n!}{(r! * (n - r)!)}$

Output: Value of nCr

CODE:

```
#include <stdio.h>

int factorial(int n) {
    int f = 1;
    for(int i = 1; i <= n; i++)
        f *= i;
    return f;
}

int nCr(int n, int r) {
    return factorial(n) / (factorial(r) * factorial(n - r));
}
```

```

int main() {

    int n, r;

    printf("Enter n and r: ");

    scanf("%d %d", &n, &r);

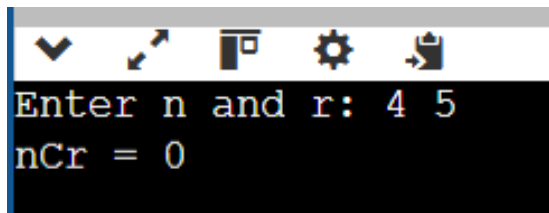
    printf("nCr = %d\n", nCr(n, r));

    return 0;

}

```

OUTPUT:



```

Enter n and r: 4 5
nCr = 0

```

6. Write a program to demonstrate call by value and call by reference.

Input: An integer variable x

Process:

- Call by value: Pass x and modify inside function (no effect outside)
- Call by reference: Pass address of x and modify actual value

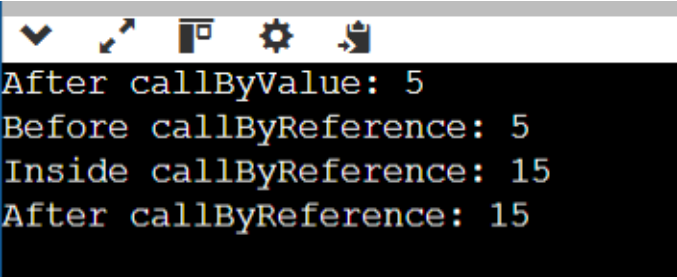
Output: Values before and after both function calls

CODE:

```
#include <stdio.h>
```

```
void callByValue(int a) {  
    a = a + 10;  
    printf("Inside callByValue: %d\n", a);  
}  
  
void callByReference(int *a) {  
    *a = *a + 10;  
    printf("Inside callByReference: %d\n", *a);  
}  
  
int main() {  
    int x = 5;  
    printf("Before callByValue: %d\n", x);  
    callByValue(x);  
    printf("After callByValue: %d\n", x);  
  
    printf("Before callByReference: %d\n", x);  
    callByReference(&x);  
    printf("After callByReference: %d\n", x);  
  
    return 0;  
}
```


OUTPUT:



```
After callByValue: 5
Before callByReference: 5
Inside callByReference: 15
After callByReference: 15
```

7. Write a program using function to swap two numbers.

Input: Two numbers a and b

Process: Use a temporary variable (or pointers) to swap values

Output: Values of a and b after swapping

CODE: #include <stdio.h>

```
void swap(int *a, int *b) {
```

```
    int temp = *a;
```

```
    *a = *b;
```

```
    *b = temp;
```

```
}
```

```
int main()
```

```

{
    int x, y;

    printf("Enter two numbers: ");

    scanf("%d %d", &x, &y);

    printf("Before swap: x = %d, y = %d\n", x, y);

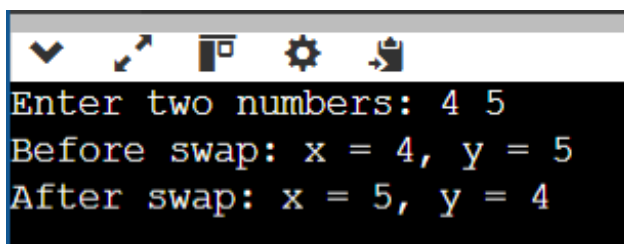
    swap(&x, &y);

    printf("After swap: x = %d, y = %d\n", x, y);

    return 0;
}

```

OUTPUT:



```

Enter two numbers: 4 5
Before swap: x = 4, y = 5
After swap: x = 5, y = 4

```

8. Write a recursive function to find the nth Fibonacci number.

Input: Integer n

Process: Use recursion to calculate nth Fibonacci number

$F(n) = F(n-1) + F(n-2)$ with base cases $F(0)=0$, $F(1)=1$

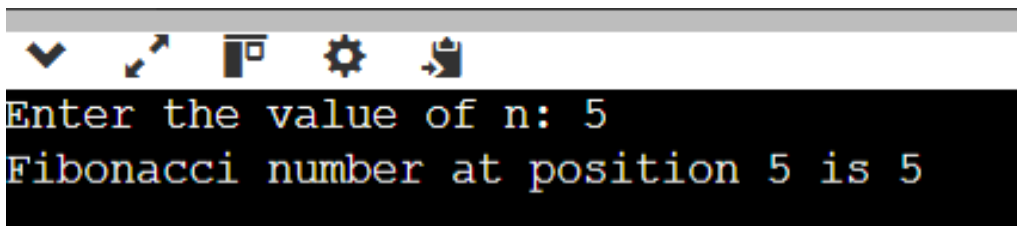
Output: nth Fibonacci number

CODE:

```
#include <stdio.h>
```

```
int fibonacci(int n) {  
    if(n == 0) return 0;  
    else if(n == 1) return 1;  
    else return fibonacci(n - 1) + fibonacci(n - 2);  
}  
  
int main() {  
    int n;  
    printf("Enter the value of n: ");  
    scanf("%d", &n);  
    printf("Fibonacci number at position %d is %d\n", n, fibonacci(n));  
    return 0;  
}
```

OUTPUT:

A screenshot of a terminal window with a dark background. The window has a title bar with standard icons (checkmark, cursor, window, gear, and a document with a checkmark). The terminal text shows the program's execution: "Enter the value of n: 5" followed by "Fibonacci number at position 5 is 5".

```
Enter the value of n: 5  
Fibonacci number at position 5 is 5
```

9. Write a program to find GCD and LCM using functions.

Input: Two integers num1 and num2

Process:

- a. GCD: Euclidean algorithm
- b. LCM: $(\text{num1} * \text{num2}) / \text{GCD}$

Output: GCD and LCM of the input numbers

CODE:

```
#include <stdio.h>

int gcd(int a, int b) {
    while(b != 0) {
        int temp = b;
        b = a % b;
        a = temp;
    }
    return a;
}

int lcm(int a, int b) {
    return (a * b) / gcd(a, b);
}

int main() {
    int num1, num2;

    printf("Enter two numbers: ");
```

```
scanf("%d %d", &num1, &num2);

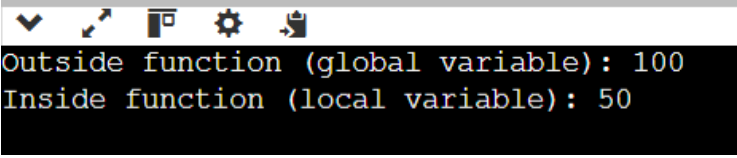
printf("GCD = %d\n", gcd(num1, num2));

printf("LCM = %d\n", lcm(num1, num2));

return 0;

}
```

OUTPUT:

A screenshot of a terminal window with a black background and white text. The window has a title bar with standard icons (minimize, maximize, close, search, settings, and a file icon). The output text is: "Outside function (global variable): 100" followed by "Inside function (local variable): 50" on the next line.

```
Outside function (global variable): 100
Inside function (local variable): 50
```

10. **Write a program to demonstrate global and local variables.**

Input: None (global and local values defined in code)

Process:

- a. Show global variable in main
- b. Shadow global variable with a local one inside show()

Output: Prints both global and local variable values

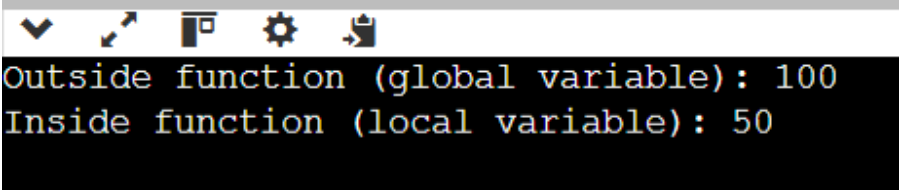
CODE:

```
#include <stdio.h>
```

```
int globalVar = 100; // Global variable
```

```
void show() {  
    int globalVar = 50; // Local variable (same name)  
    printf("Inside function (local variable): %d\n", globalVar);  
}  
  
int main() {  
  
    printf("Outside function (global variable): %d\n", globalVar);  
    show();  
    return 0;  
}
```

OUTPUT:



A screenshot of a terminal window with a dark background. The window has a title bar with standard Linux window controls (minimize, maximize, close) and a toolbar with icons for a dropdown menu, a cursor, a window, a gear, and a clipboard. The terminal output consists of two lines: "Outside function (global variable): 100" and "Inside function (local variable): 50".

```
Outside function (global variable): 100  
Inside function (local variable): 50
```