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PPS7

Q1

Aim:

Write a function in ‘C’ to perform factorial of natural number ‘n’. Get the user input for ‘n’.

Procedure:

Input:

A natural number, n

Output:

Factorial of n

Algorithm:

```
Step 1: Declare ‘factorial’ function with return type ‘int’ and argument ‘int n’
```

Main Function

```
Step 1: Declare variables n and r
Step 2: Read a natural number ‘n’ from user
Step 3: Call ‘factorial’ function and save its return value in r
Step 4: Display ‘r’ which is the factorial of ‘n’
```

Factorial Function (Recursion)

```
Step 1: If n is equal to 0 or n is equal to 1
        return 1
Step 2: Else call the function again in return statement
        return n*factorial(n-1)
```

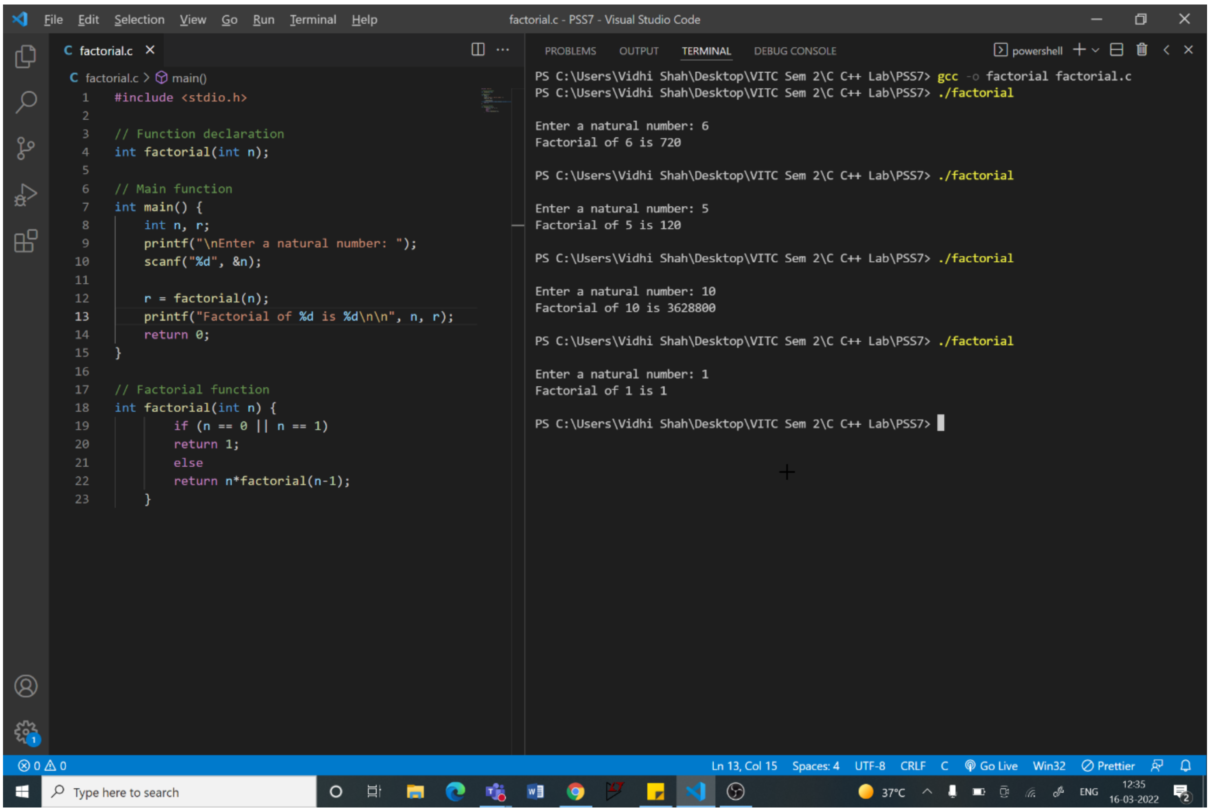
Code:

```c
#include <stdio.h>

// Function declaration
int factorial(int n);

// Main function
int main() {
    int n, r;
    printf("\nEnter a natural number: ");
    scanf("%d", &n);

    r = factorial(n);
    printf("Factorial of %d is %d\n\n", n, r);
    return 0;
}
// Factorial function
int factorial(int n) {
        if (n == 0 || n == 1)
        return 1;
        else
        return n*factorial(n-1);
    }
```



```c
#include <stdio.h>

// Function declaration
int factorial(int n);

// Main function
int main() {
    int n, r;
    printf("\nEnter a natural number: ");
    scanf("%d", &n);

    r = factorial(n);
    printf("Factorial of %d is %d\n\n", n, r);
    return 0;
}

// Factorial function
int factorial(int n) {
        if (n == 0 || n == 1)
        return 1;
        else
        return n*factorial(n-1);
    }
```

```
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> gcc -o factorial factorial.c
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> ./factorial

Enter a natural number: 6
Factorial of 6 is 720

PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> ./factorial

Enter a natural number: 5
Factorial of 5 is 120

PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> ./factorial

Enter a natural number: 10
Factorial of 10 is 3628800

PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> ./factorial

Enter a natural number: 1
Factorial of 1 is 1

PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> 
```

File Edit Selection View Go Run Terminal Help
factorial.c - PSS7 - Visual Studio Code
factorial.c
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE
powershell
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Q2

Aim:

Write a function using ‘C’ to find the square of a number given by the user.

Procedure:

Input:

An integer number, n

Output:

Square of number n

Algorithm:

Step 1: Declare ‘square’ function with return type ‘int’ and argument ‘int n’

Main Function

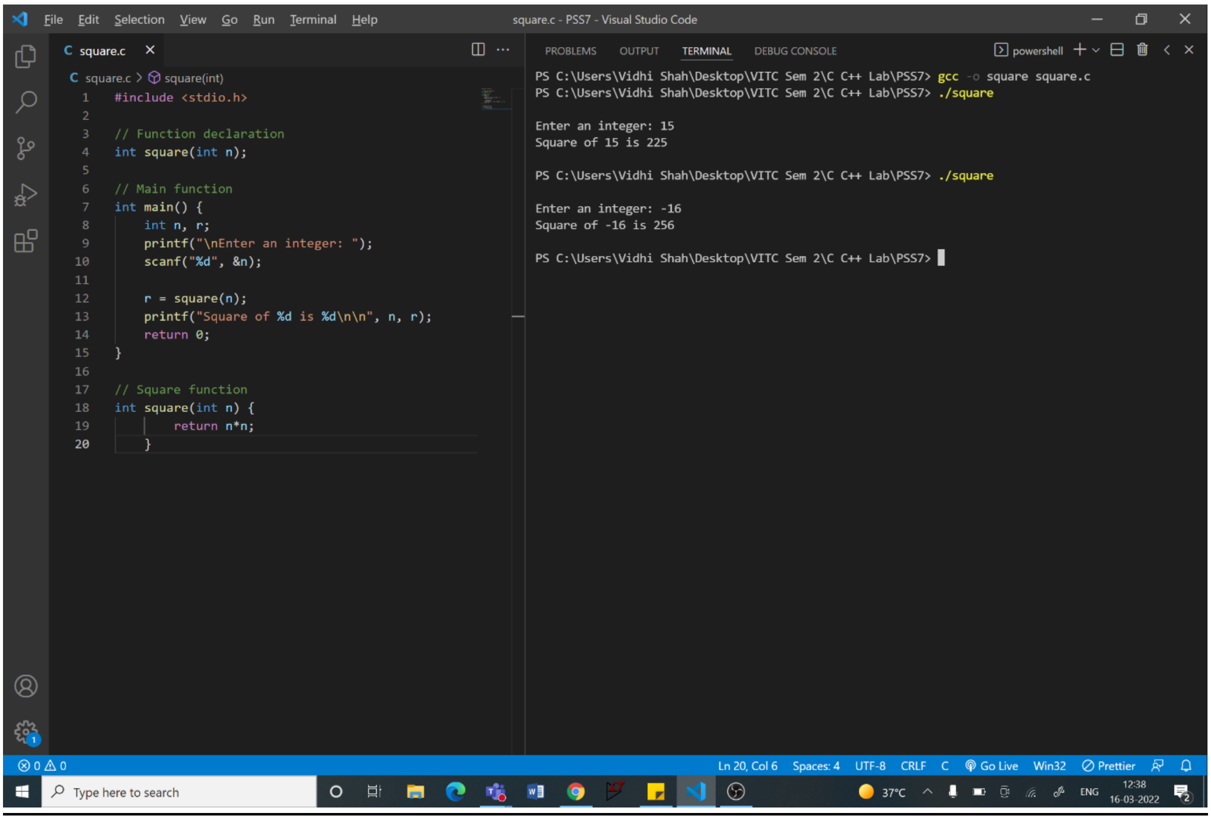
Step 1: Declare variables n and r
Step 2: Read an integer number ‘n’ from user
Step 3: Call ‘square’ function and save its return value in r
Step 4: Display ‘r’ which is the square of ‘n’

Square Function

Step 1: Return n*n

Code:

```
#include <stdio.h>

// Function declaration
int square(int n);

// Main function
int main() {
    int n, r;
    printf("\nEnter an integer: ");
    scanf("%d", &n);

    r = square(n);
    printf("Square of %d is %d\n\n", n, r);
    return 0;
}

// Square function
int square(int n) {
        return n*n;
    }
```



```
#include <stdio.h>

// Function declaration
int square(int n);

// Main function
int main() {
    int n, r;
    printf("\nEnter an integer: ");
    scanf("%d", &n);

    r = square(n);
    printf("Square of %d is %d\n\n", n, r);
    return 0;
}

// Square function
int square(int n) {
        return n*n;
    }
```

```
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> gcc -o square square.c
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> ./square

Enter an integer: 15
Square of 15 is 225

PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7> ./square

Enter an integer: -16
Square of -16 is 256

PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PSS7>
```

Q3

Aim:

Write a 'C' Program to perform Matrix Addition for n x n Matrix. Get the user input for 'n'.

Procedure:

Input:

A natural number, n
Matrix 1 and Matrix 2 of dimension n x n

Output:

Matrix addition of matrix 1 and matrix 2

Algorithm:

```
Step 1: Declare variables n, i, j
Step 2: Declare 'matrixaddn' function with return type 'void' and argument of
        2 integer matrices
```

Main Function

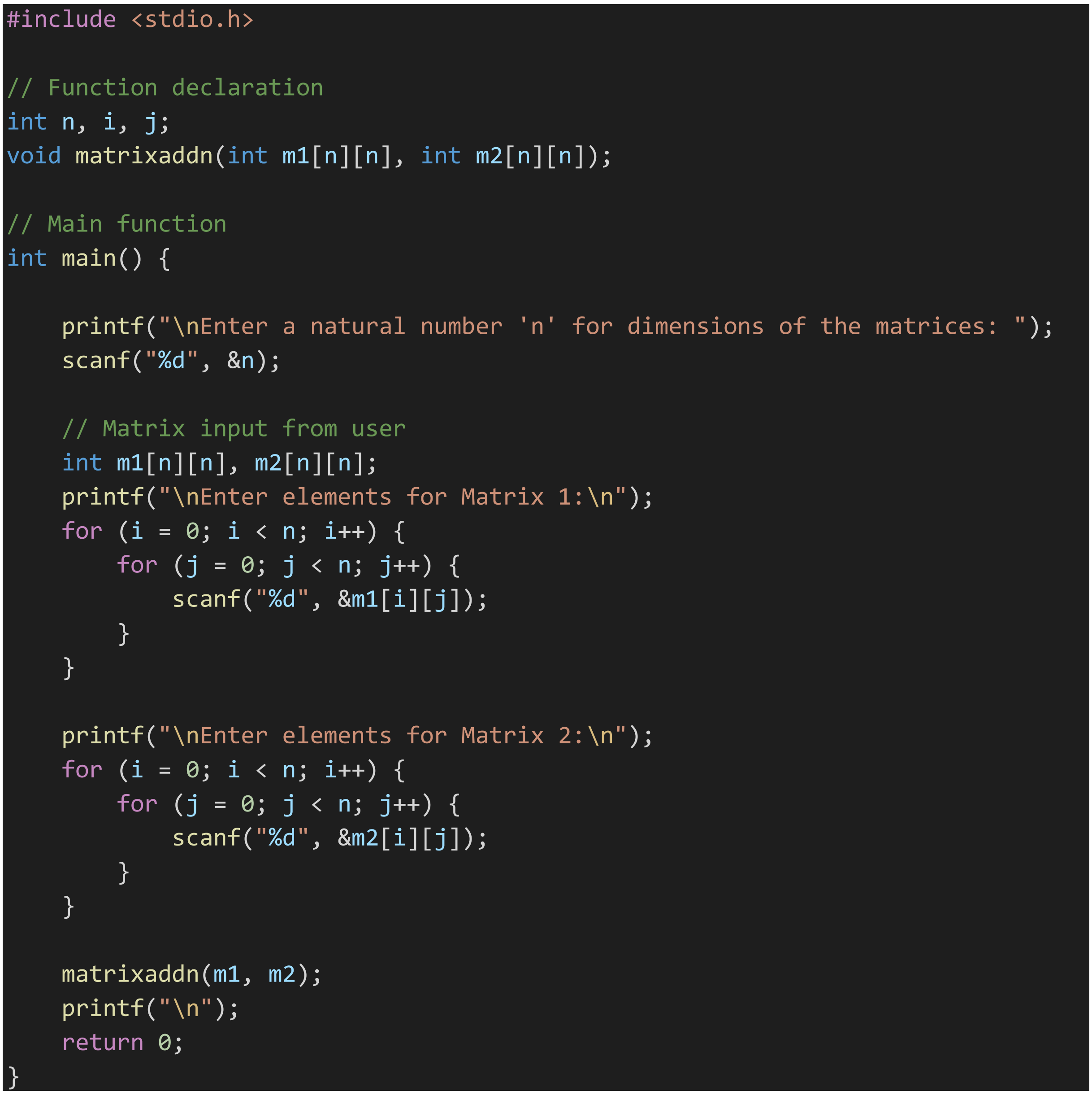
```
Step 1: Read a natural number 'n' from user
Step 2: Declare 2 integer matrices, 'm1' and 'm2', of dimension n x n
Step 2: Read and store elements of matrix 1, m1, using for loop
Step 3: Read and store elements of matrix 2, m2, using for loop
Step 4: Call 'matrixaddn' function
```

Matrix Addition Function

```
Step 1: Declare matrix 'ma' of dimension n x n
Step 2: Initialise i to 0. For i < n
            Initialise j to 0. For j < n
                ma[i][j] = m1[i][j] + m2[i][j]
                Increment j
            Increment i
Step 3: Print elements of matrix 'ma' using for loop
```

Code:

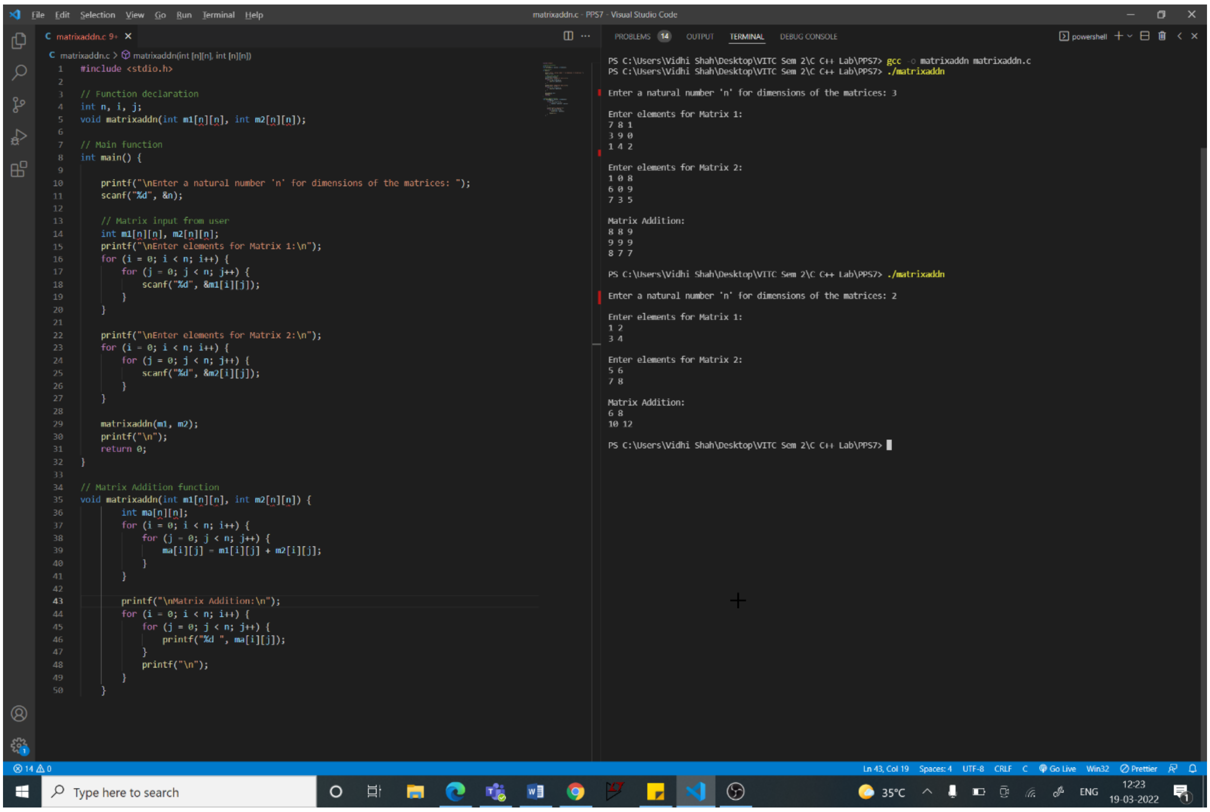
Main Function



```c
#include <stdio.h>

// Function declaration
int n, i, j;
void matrixaddn(int m1[n][n], int m2[n][n]);

// Main function
int main() {

    printf("\nEnter a natural number 'n' for dimensions of the matrices: ");
    scanf("%d", &n);

    // Matrix input from user
    int m1[n][n], m2[n][n];
    printf("\nEnter elements for Matrix 1:\n");
    for (i = 0; i < n; i++) {
        for (j = 0; j < n; j++) {
            scanf("%d", &m1[i][j]);
        }
    }

    printf("\nEnter elements for Matrix 2:\n");
    for (i = 0; i < n; i++) {
        for (j = 0; j < n; j++) {
            scanf("%d", &m2[i][j]);
        }
    }

    matrixaddn(m1, m2);
    printf("\n");
    return 0;
}
```

Matrix Addition Function

```c
// Matrix Addition function
void matrixaddn(int m1[n][n], int m2[n][n]) {
        int ma[n][n];
        for (i = 0; i < n; i++) {
            for (j = 0; j < n; j++) {
                ma[i][j] = m1[i][j] + m2[i][j];
            }
        }

        printf("Matrix Addition:\n");
        for (i = 0; i < n; i++) {
            for (j = 0; j < n; j++) {
                printf("%d ", ma[i][j]);
            }
            printf("\n");
        }
    }
```



```c
#include <stdio.h>

// Function declaration
int n, i, j;
void matrixaddn(int m1[n][n], int m2[n][n]);

// Main function
int main() {

    printf("\nEnter a natural number 'n' for dimensions of the matrices: ");
    scanf("%d", &n);

    // Matrix input from user
    int m1[n][n], m2[n][n];
    printf("\nEnter elements for Matrix 1:\n");
    for (i = 0; i < n; i++) {
        for (j = 0; j < n; j++) {
            scanf("%d", &m1[i][j]);
        }
    }

    printf("\nEnter elements for Matrix 2:\n");
    for (i = 0; i < n; i++) {
        for (j = 0; j < n; j++) {
            scanf("%d", &m2[i][j]);
        }
    }

    matrixaddn(m1, m2);
    printf("\n");
    return 0;
}

// Matrix Addition function
void matrixaddn(int m1[n][n], int m2[n][n]) {
        int ma[n][n];
        for (i = 0; i < n; i++) {
            for (j = 0; j < n; j++) {
                ma[i][j] = m1[i][j] + m2[i][j];
            }
        }

        printf("\nMatrix Addition:\n");
        for (i = 0; i < n; i++) {
            for (j = 0; j < n; j++) {
                printf("%d ", ma[i][j]);
            }
            printf("\n");
        }
    }
```

```
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS7> gcc -o matrixaddn matrixaddn.c
PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS7> ./matrixaddn

Enter a natural number 'n' for dimensions of the matrices: 3

Enter elements for Matrix 1:
7 8 1
3 9 0
1 4 2

Enter elements for Matrix 2:
1 0 8
6 0 9
7 3 5

Matrix Addition:
8 8 9
9 9 9
8 7 7

PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS7> ./matrixaddn

Enter a natural number 'n' for dimensions of the matrices: 2

Enter elements for Matrix 1:
1 2
3 4

Enter elements for Matrix 2:
5 6
7 8

Matrix Addition:
6 8
10 12

PS C:\Users\Vidhi Shah\Desktop\VITC Sem 2\C C++ Lab\PPS7>
```