

while_dowhile_loop.c

```
1  #include <stdio.h>
2  // Example of while and do-while loops in C
3  int main() {
4      int n;
5      // Prompt user for input
6      printf("Enter a positive integer: ");
7      scanf("%d", &n);
8      // Print numbers from 1 to n
9      int i = 1;
10     while (i <= n) {
11         printf("%d\n", i);
12         i++;
13     }
14
15     // example of do-while loop
16     int j = 1;
17     printf("Using do-while loop:\n");
18     do {
19         printf("%d\n", j);
20         j++;
21     } while (j <= n);
22
23     return 0;
24 }
25
26 /*****
27  * Output Example:
28  * Enter a positive integer: 5
29  * 1
30  * 2
31  * 3
32  * 4
33  * 5
34  * Using do-while loop:
35  * 1
36  * 2
37  * 3
38  * 4
39  * 5
40  *****/
41 */
42
```

factorial.c

```
1  #include <stdio.h>
2
3  // write a function to calculate factorial of a number using for loop
4
5  int main(){
6
7      int num;
8      printf("Enter a number: ");
9      scanf("%d", &num);
10
11     // Factorial calculation
12     int fact = 1;
13     for(int i = 1; i <= num; i++){
14         fact = fact * i;
15     }
16     printf("Factorial of %d is %d\n", num, fact);
17     return 0;
18 }
19
20
21 /**
22  * What happens in the loop?
23
24  Loop runs from i = 1 to i = num
25
26  Each time, multiply the current value of fact by i
27
28  This builds the factorial step-by-step
29
30  Example for num = 5:
31
32  i    fact
33  -----
34  1    1 × 1 = 1
35  2    1 × 2 = 2
36  3    2 × 3 = 6
37  4    6 × 4 = 24
38  5    24 × 5 = 120
39
40  Final value = 120
41  */
42
43
```

array_1.c

```
1  #include <stdio.h>
2
3  // example of array in C
4
5  int main(){
6
7      int marks[5] = {85, 90, 78, 92, 88};
8      for(int i = 0; i < 5; i++){
9          printf("Marks of student %d: %d\n", i+1, marks[i]);
10     }
11     return 0;
12 }
13
14 /**
15  * Example Output:
16 Marks of student 1: 85
17 Marks of student 2: 90
18 Marks of student 3: 78
19 Marks of student 4: 92
20 Marks of student 5: 88
21  */
```

array_2.c

```
1  #include <stdio.h>
2
3  // Two dimensional array example in C
4
5  int main(){
6
7      /*
8      int matrix[3][3] = {
9          {1, 2, 3},
10         {4, 5, 6},
11         {7, 8, 9}
12     };
13
14     // Print the matrix
15     for(int i = 0; i < 3; i++){
16         for(int j = 0; j < 3; j++){
17             printf("%d ", matrix[i][j]);
18         }
19         printf("\n");
20     }
21     */
22
23     int i=0,j=0;
24     int arr[4][3]={1,2,3},{2,3,4},{3,4,5},{4,5,6}};
25
26     for(i=0;i<4;i++){
27         for(j=0;j<3;j++){
28             printf("arr[%d] [%d] = %d \n",i,j,arr[i][j]);
29         }
30     }
31
32     return 0;
33 }
```

rightHalfPyramid.c

```
1  #include <stdio.h>
2
3  // right half pyramid pattern
4
5  int main() {
6      int rows = 5;
7
8      // This loop for traverse
9      // pyramid from top to bottom
10     for (int i = 0; i < rows; i++) {
11
12         // Inner loop for printing
13         // character in each rows
14         for (int j = 0; j <= i; j++) {
15             printf("* ");
16         }
17         printf("\n");
18     }
19     return 0;
20 }
21
22 /**
23  * Output:
24  *
25  * *
26  * * *
27  * * * *
28  * * * * *
29  */
```

matrixAddition.c

```
1  #include <stdio.h>
2
3  // Function to add two matrices of same dimensions
4
5  int main(){
6
7      // Declaring two 2x3 matrices and a result matrix
8      int a[2][3], b[2][3], sum[2][3], i,j;
9
10     // Taking input for first matrix
11     printf("Enter elements of first matrix:\n");
12     for(i=0; i<2; i++){
13         for(j=0; j<3; j++){
14             printf("Element [%d][%d]: ", i, j);
15             scanf("%d", &a[i][j]);
16         }
17     }
18
19     // Taking input for second matrix
20     printf("Enter elements of second matrix:\n");
21     for(i=0; i<2; i++){
22         for(j=0; j<3; j++){
23             printf("Element [%d][%d]: ", i, j);
24             scanf("%d", &b[i][j]);
25         }
26     }
27
28     // Displaying the first matrix
29     printf("First matrix:\n");
30     for(i=0; i<2; i++){
31         for(j=0; j<3; j++){
32             printf("%d ", a[i][j]);
33         }
34         printf("\n");
35     }
36
37     // Displaying the second matrix
38     printf("Second matrix:\n");
39     for(i=0; i<2; i++){
40         for(j=0; j<3; j++){
41             printf("%d ", b[i][j]);
42         }
43         printf("\n");
44     }
45
46     // Adding the two matrices
47     for(i=0; i<2; i++){
48         for(j=0; j<3; j++){
49             sum[i][j] = a[i][j] + b[i][j];
50         }
51     }
```

```

52
53 // Displaying the sum
54 printf("Sum of the two matrices:\n");
55 for(i=0; i<2; i++){
56     for(j=0; j<3; j++){
57         printf("%d ", sum[i][j]);
58     }
59     printf("\n");
60 }
61
62 return 0;
63 }
64
65
66 /**
67  * *****
68  * Example Input/Output:
69  * *****
70 Enter elements of first matrix:
71 Element [0][0]: 2
72 Element [0][1]: 1
73 Element [0][2]: 3
74 Element [1][0]: 4
75 Element [1][1]: 5
76 Element [1][2]: 6
77 Enter elements of second matrix:
78 Element [0][0]: 6
79 Element [0][1]: 1
80 Element [0][2]: 9
81 Element [1][0]: 5
82 Element [1][1]: 4
83 Element [1][2]: 5
84 First matrix:
85 2 1 3
86 4 5 6
87 Second matrix:
88 6 1 9
89 5 4 5
90 Sum of the two matrices:
91 8 2 12
92 9 9 11
93 *****/

```

matrixSubstraction.c

```
1  #include <stdio.h>
2
3  int main() {
4      int rows, cols;
5
6      // Get dimensions from the user
7      printf("Enter the number of rows: ");
8      scanf("%d", &rows);
9      printf("Enter the number of columns: ");
10     scanf("%d", &cols);
11
12     // Declare matrices
13     int matrixA[rows][cols];
14     int matrixB[rows][cols];
15     int resultMatrix[rows][cols];
16
17     // Input elements for matrix A
18     printf("\nEnter elements for Matrix A:\n");
19     for (int i = 0; i < rows; i++) {
20         for (int j = 0; j < cols; j++) {
21             printf("Enter element A[%d][%d]: ", i, j);
22             scanf("%d", &matrixA[i][j]);
23         }
24     }
25
26     // Input elements for matrix B
27     printf("\nEnter elements for Matrix B:\n");
28     for (int i = 0; i < rows; i++) {
29         for (int j = 0; j < cols; j++) {
30             printf("Enter element B[%d][%d]: ", i, j);
31             scanf("%d", &matrixB[i][j]);
32         }
33     }
34
35     // display matrix A
36     printf("\nMatrix A:\n");
37     for (int i = 0; i < rows; i++) {
38         for (int j = 0; j < cols; j++) {
39             printf("%d\t", matrixA[i][j]);
40         }
41         printf("\n");
42     }
43
44     // display matrix B
45     printf("\nMatrix B:\n");
46     for (int i = 0; i < rows; i++) {
47         for (int j = 0; j < cols; j++) {
48             printf("%d\t", matrixB[i][j]);
49         }
50         printf("\n");
51     }
```



```

52
53 // Perform matrix subtraction (A - B)
54 for (int i = 0; i < rows; i++) {
55     for (int j = 0; j < cols; j++) {
56         resultMatrix[i][j] = matrixA[i][j] - matrixB[i][j];
57     }
58 }
59
60 // Print the result matrix
61 printf("\nResult of Matrix A - Matrix B:\n");
62 for (int i = 0; i < rows; i++) {
63     for (int j = 0; j < cols; j++) {
64         printf("%d\t", resultMatrix[i][j]);
65     }
66     printf("\n");
67 }
68
69 return 0;
70 }
71
72 /**
73  * Example Input/Output:
74  * Enter the number of rows: 2
75 Enter the number of columns: 2
76
77 Enter elements for Matrix A:
78 Enter element A[0][0]: 1
79 Enter element A[0][1]: 4
80 Enter element A[1][0]: 5
81 Enter element A[1][1]: 6
82
83 Enter elements for Matrix B:
84 Enter element B[0][0]: 2
85 Enter element B[0][1]: 3
86 Enter element B[1][0]: 1
87 Enter element B[1][1]: 6
88
89 Matrix A:
90 1      4
91 5      6
92
93 Matrix B:
94 2      3
95 1      6
96
97 Result of Matrix A - Matrix B:
98 -1     1
99 4      0
100 */

```