Day -3

Assignment

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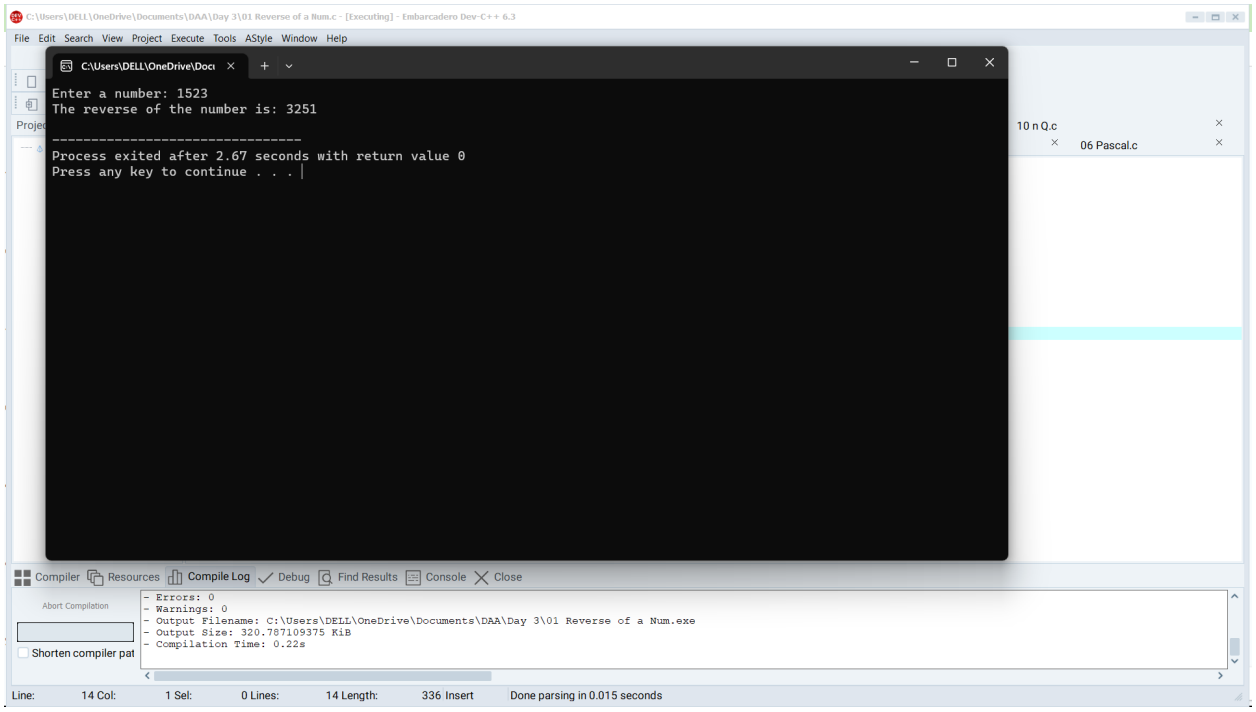
1. Write a program to find the reverse of a given number.

```
#include <stdio.h>

int main() {

        int num, reversed = 0;

   printf("Enter a number: ");

   scanf("%d", &num);

        while (num != 0) {

        int remainder = num % 10;

        reversed = reversed * 10 + remainder;

        num = num / 10;

        }

   printf("The reverse of the number is: %d\n", reversed);

        return 0;

}
```

OUTPUT:

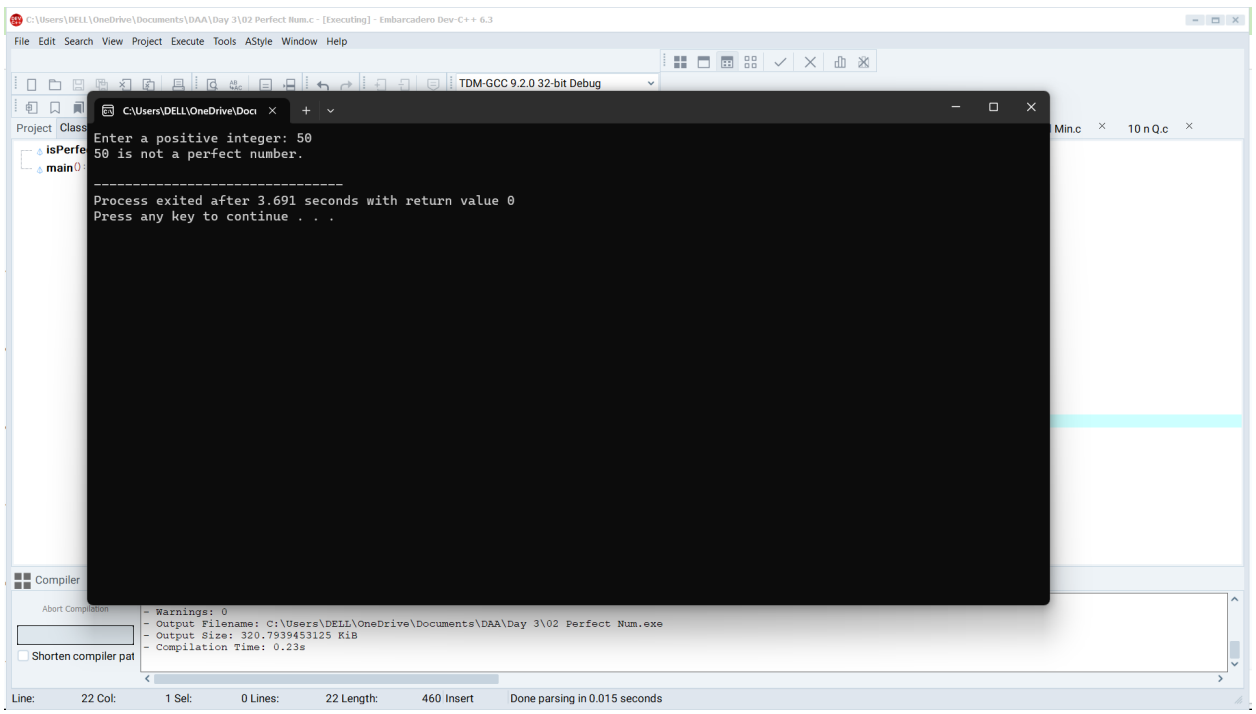


2. Write a program to find the perfect number.

```
#include <stdio.h>

int isPerfect(int num) {

        int sum = 0;

        for (int i = 1; i <= num / 2; i++) {

        if (num % i == 0) {

        sum += i;

        }

        }

        return sum == num;

}

int main() {

        int n;
```

```
    printf("Enter a positive integer: ");
    scanf("%d", &n);
        if (isPerfect(n)) {
      printf("%d is a perfect number.\n", n);
        } else {
      printf("%d is not a perfect number.\n", n);
        }
        return 0;
}
```

OUTPUT:



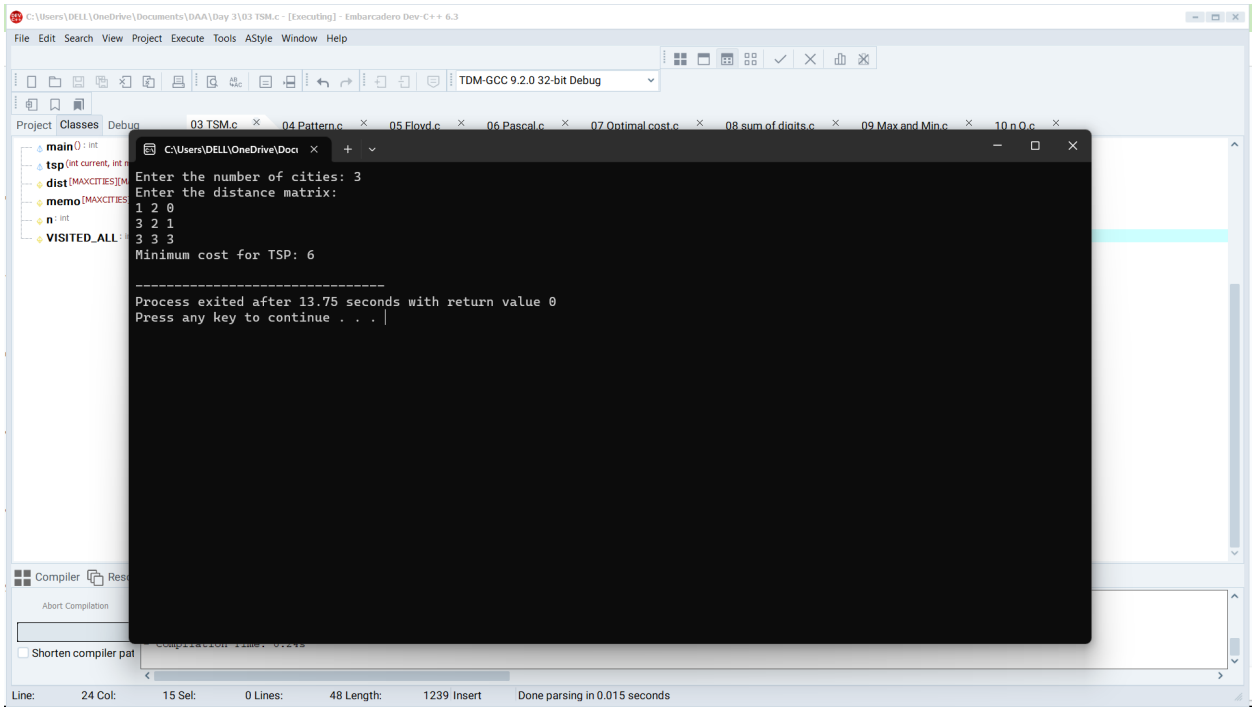
3. Write a program to perform travelling salesman problem using dynamic programming

```
#include <stdio.h>

#include <limits.h>
```

```
#define MAXCITIES 20
int n;
int dist[MAXCITIES][MAXCITIES];
int memo[MAXCITIES][1 << MAXCITIES];
int VISITED_ALL;
int tsp(int current, int mask) {
        if (mask == VISITED_ALL) {
        return dist[current][0];
        }
        if (memo[current][mask] != -1) {
        return memo[current][mask];
        }
        int minCost = INT_MAX;
        for (int city = 0; city < n; city++) {
        if ((mask & (1 << city)) == 0) {
        int newCost = dist[current][city] + tsp(city, mask | (1 << city));
        if (newCost < minCost) {
            minCost = newCost;
        }
        }
        }
    memo[current][mask] = minCost;
        return minCost;
}
```

```
int main() {
        printf("Enter the number of cities: ");
    scanf("%d", &n);

    printf("Enter the distance matrix:\n");
        for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
        scanf("%d", &dist[i][j]);
        }
        }
        for (int i = 0; i < n; i++) {
        for (int j = 0; j < (1 << n); j++) {
        memo[i][j] = -1;
        }
        }
        VISITED_ALL = (1 << n) - 1;
        int minCost = tsp(0, 1);
    printf("Minimum cost for TSP: %d\n", minCost);
        return 0;
}
```

OUTPUT:



4. Write a program for the given pattern

If n=4 1

1 2

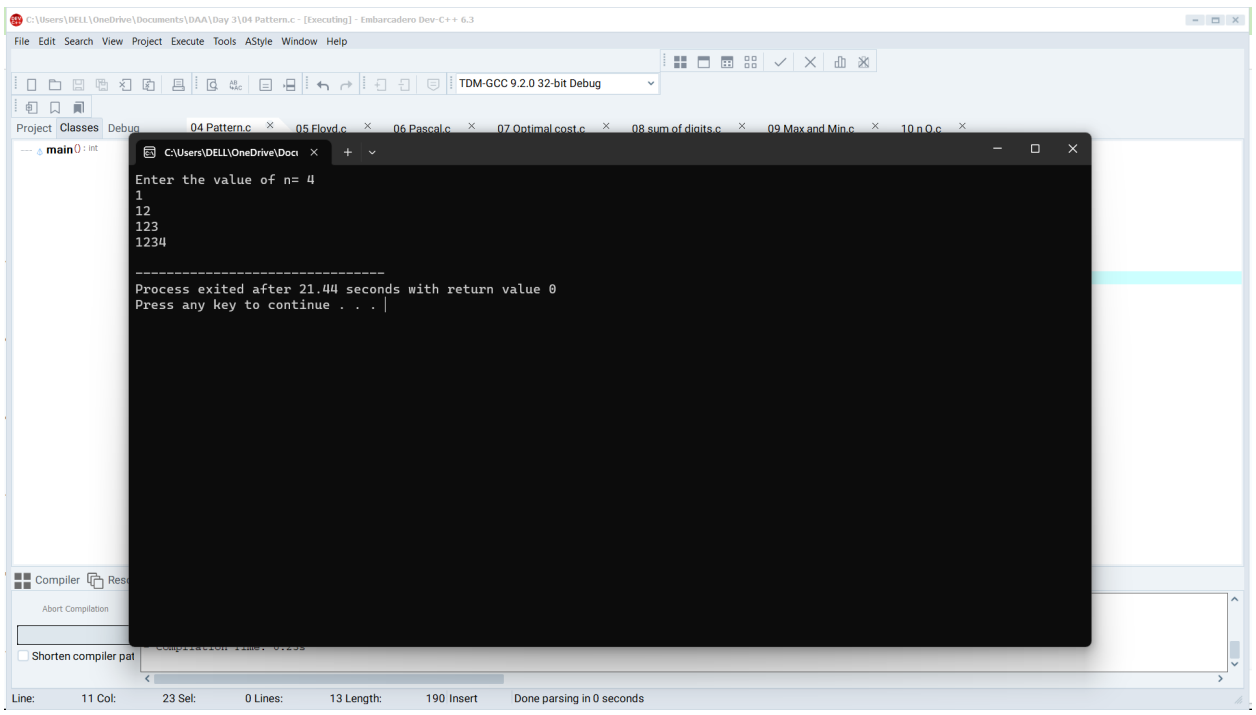
1 2 3

1 2 3 4

```
#include<stdio.h>

int main()

{

        int a,i,j;

        printf("Enter the value of n= ");

        scanf("%d",&a);

        for(i=1;i<=a;i++){
```

```
                    for(j=1;j<=i;j++){
                    printf("%d",j);
        }
                        printf("\n");
        }
}
```

OUTPUT:



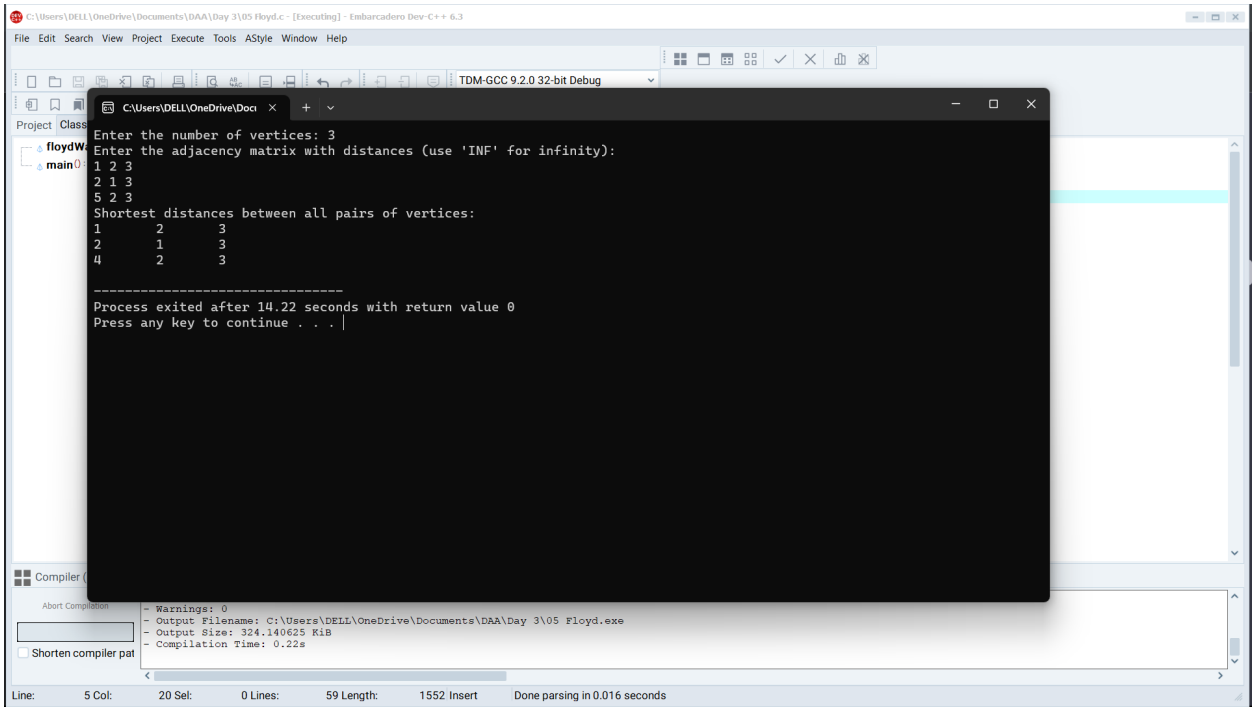
5. Write a program to perform Floyd's algorithm

```
#include <stdio.h>

#include <limits.h>

#define V 100

void floydWarshall(int graph[V][V], int n) {

        int dist[V][V];

        for (int i = 0; i < n; i++) {
```

```
        for (int j = 0; j < n; j++) {
        dist[i][j] = graph[i][j];
        }
        }
        for (int k = 0; k < n; k++) {
        for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            if (dist[i][k] != INT_MAX && dist[k][j] != INT_MAX &&
                dist[i][k] + dist[k][j] < dist[i][j]) {
                dist[i][j] = dist[i][k] + dist[k][j];
            }
        }
        }
        }
printf("Shortest distances between all pairs of vertices:\n");
        for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
        if (dist[i][j] == INT_MAX) {
            printf("INF\t");
        } else {
            printf("%d\t", dist[i][j]);
        }
        }
    printf("\n");
```

```
        }
}

int main() {
        int n;
    printf("Enter the number of vertices: ");
    scanf("%d", &n);

        int graph[V][V];

    printf("Enter the adjacency matrix with distances (use 'INF' for infinity):\n");
        for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
        scanf("%d", &graph[i][j]);
        if (graph[i][j] == -1) {
            graph[i][j] = INT_MAX;
        }
        }
        }

    floydWarshall(graph, n);

        return 0;
}
```

OUTPUT:

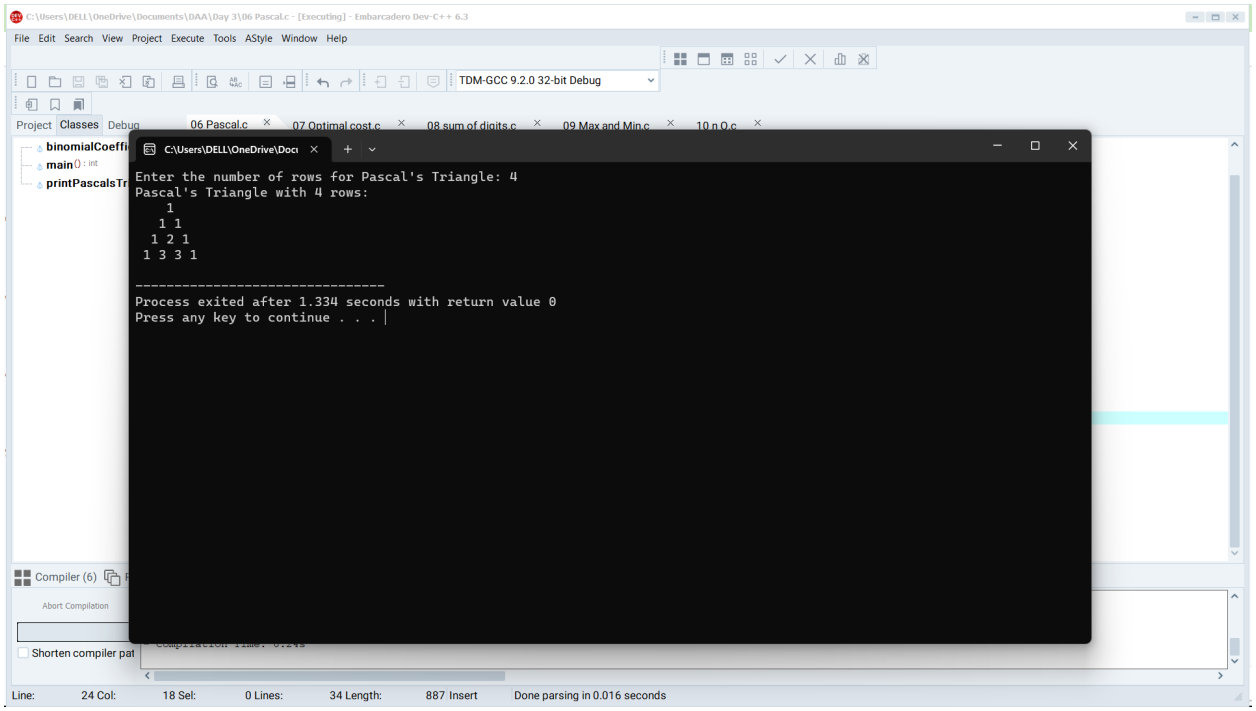


6. Write a program for pascal triangle.

```
#include <stdio.h>

int binomialCoefficient(int n, int k) {

        if (k == 0 || k == n)

        return 1;

        return binomialCoefficient(n - 1, k - 1) + binomialCoefficient(n - 1, k);

}

void printPascalsTriangle(int numRows) {

        for (int i = 0; i < numRows; i++) {

        for (int j = 0; j < numRows - i; j++) {

        printf(" ");

        }

        for (int j = 0; j <= i; j++) {
```

```
            int coef = binomialCoefficient(i, j);
            printf("%d ", coef);
            }
        printf("\n");
            }
}

int main() {
            int numRows;

    printf("Enter the number of rows for Pascal's Triangle: ");
    scanf("%d", &numRows);

            if (numRows <= 0) {
        printf("Please enter a positive number of rows.\n");
            } else {
        printf("Pascal's Triangle with %d rows:\n", numRows);
                printPascalsTriangle(numRows);
            }

            return 0;
}
```

OUTPUT:



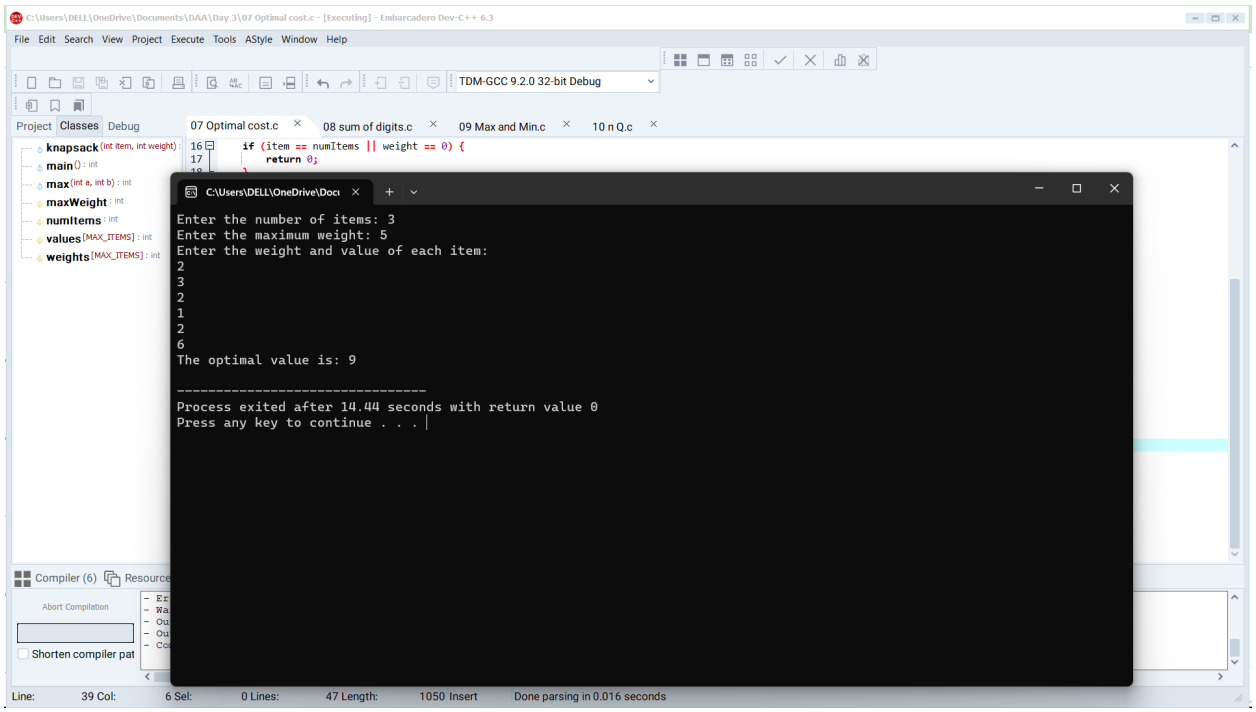
7. Write a program to find the optimal cost by using appropriate algorithm

```
#include <stdio.h>

#define MAX_ITEMS 100

#define MAX_WEIGHT 100

int weights[MAX_ITEMS];

int values[MAX_ITEMS];

int numItems;

int maxWeight;

int max(int a, int b) {

        return (a > b) ? a : b;

}


int knapsack(int item, int weight) {
```

```
        if (item == numItems || weight == 0) {
        return 0;
        }

        if (weights[item] > weight) {
        return knapsack(item + 1, weight);
        } else {
        int include = values[item] + knapsack(item + 1, weight - weights[item]);
        int exclude = knapsack(item + 1, weight);
        return max(include, exclude);
        }
}

int main() {
    printf("Enter the number of items: ");
    scanf("%d", &numItems);

    printf("Enter the maximum weight: ");
    scanf("%d", &maxWeight);
    printf("Enter the weight and value of each item:\n");
        for (int i = 0; i < numItems; i++) {
      scanf("%d %d", &weights[i], &values[i]);
        }
        int optimalValue = knapsack(0, maxWeight);
```

```
    printf("The optimal value is: %d\n", optimalValue);

        return 0;

}
```

OUTPUT:

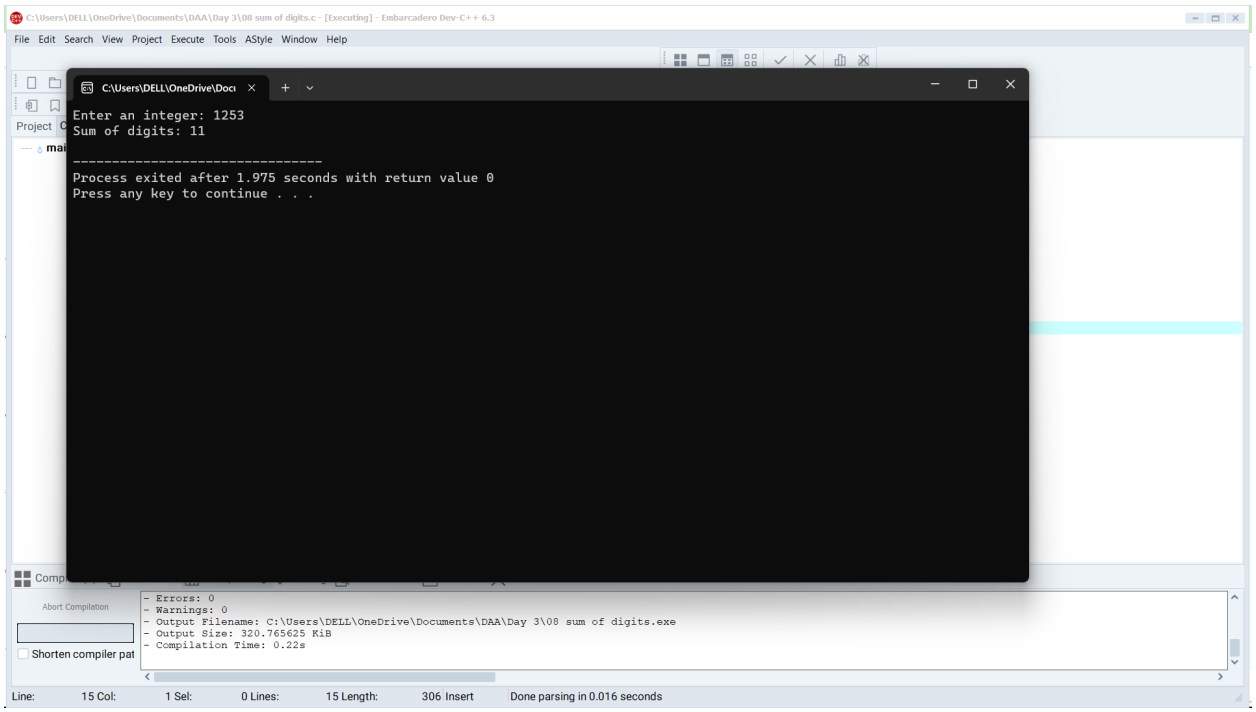


8. Write a program to find the sum of digits.

```
#include <stdio.h>

int main() {

        int num, sum = 0;

    printf("Enter an integer: ");

    scanf("%d", &num);

        while (num != 0) {

        int digit = num % 10;

        sum += digit;

        num /= 10;
```

```
        }
    printf("Sum of digits: %d\n", sum);


        return 0;
}
```

OUTPUT:



9. Write a program to print minimum and maximum value sequency for all the numbers in a

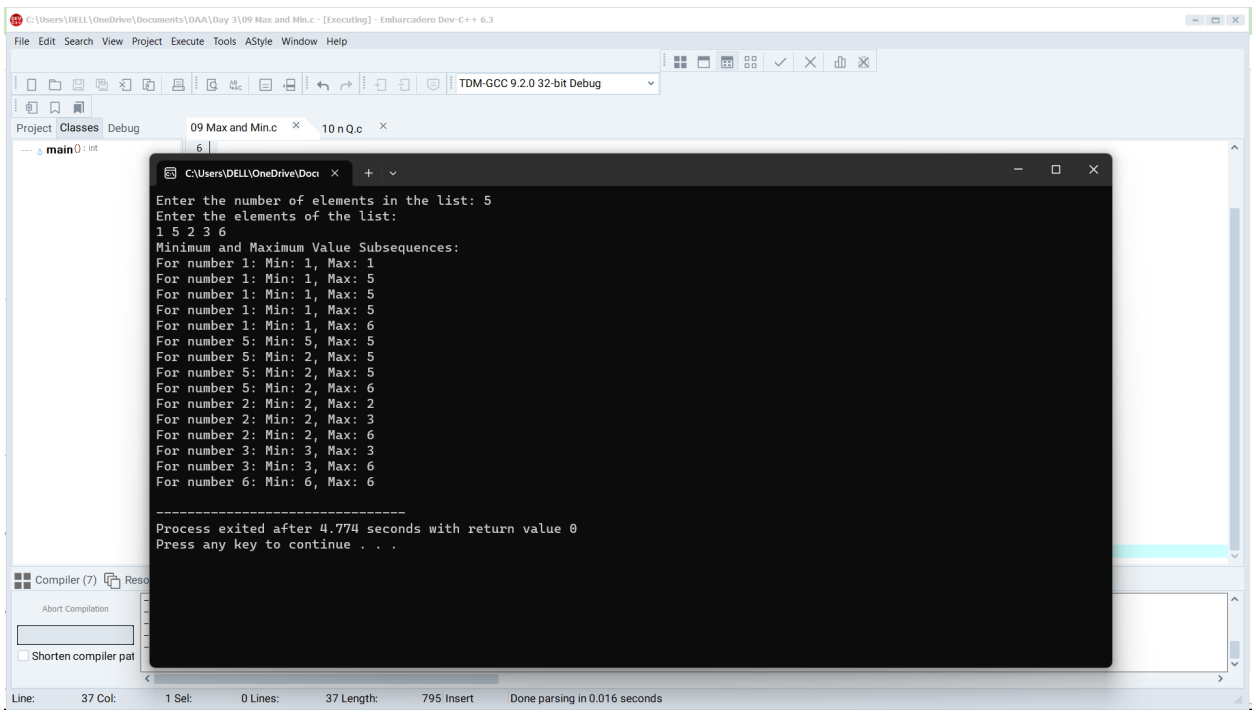
list.

```
#include <stdio.h>

#include <limits.h>


int main() {

        int n;
```

```
printf("Enter the number of elements in the list: ");
scanf("%d", &n);

        int list[n];

printf("Enter the elements of the list:\n");
        for (int i = 0; i < n; i++) {
    scanf("%d", &list[i]);
        }

printf("Minimum and Maximum Value Subsequences:\n");

        for (int i = 0; i < n; i++) {
        int minVal = INT_MAX;
        int maxVal = INT_MIN;

        for (int j = i; j < n; j++) {
        if (list[j] < minVal) {
            minVal = list[j];
        }
        if (list[j] > maxVal) {
            maxVal = list[j];
        }
```

```
        printf("For number %d: Min: %d, Max: %d\n", list[i], minVal, maxVal);
        }
        }

        return 0;
}
```

OUTPUT:



10. Write a program to perform n Queens Problem using backtracking.

```
#include <stdio.h>

#include <stdbool.h>

bool isSafe(int board[][100], int row, int col, int n) {

        if (board[i][col] == 1) {

        return false;
```

```
        }
        }
        for (int i = row, j = col; i >= 0 && j >= 0; i--, j--) {
        if (board[i][j] == 1) {
        return false;
        }
        }
        for (int i = row, j = col; i >= 0 && j < n; i--, j++) {
        if (board[i][j] == 1) {
        return false;
      }
        }
        return true;
}
void printBoard(int board[][100], int n) {
        for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
        printf("%d ", board[i][j]);
        }
      printf("\n");
        }
}
bool solveNQueens(int board[][100], int row, int n) {
        if (row == n) {
```

```
        printBoard(board, n);
            return true;
            }
            for (int col = 0; col < n; col++) {
            if (isSafe(board, row, col, n)) {
            board[row][col] = 1;
            if (solveNQueens(board, row + 1, n)) {
                return true;
            }
            board[row][col] = 0;
            }
            }
            return false;
}

int main() {
            int n;

    printf("Enter the board size (N): ");
    scanf("%d", &n);

    int board[100][100] = {0};

            if (!solveNQueens(board, 0, n)) {
```

```
        printf("No solution exists for N=%d.\n", n);
    }

    return 0;
}
```

OUTPUT: