

Problem 1:

```
#include <iostream>
using namespace std;

int main()
{
    int V = 5;
    int graph[5][5] =
    {
        {0, 2, 3, 0, 0},
        {2, 0, 15, 2, 0},
        {3, 15, 0, 0, 13},
        {0, 2, 0, 0, 9},
        {0, 0, 13, 9, 0}
    };

    cout << "Enter source vertex: ";
    int source;
    cin >> source;

    int dist[5];
    bool visited[5];

    for (int i = 0; i < V; i++)
    {
        dist[i] = 999999;
        visited[i] = false;
    }
    dist[source] = 0;

    for (int count = 0; count < V - 1; count++)
    {
        int u = -1;
        int min = 999999;
        for (int i = 0; i < V; i++)
        {
            if (visited[i] == false && dist[i] < min)
            {
                min = dist[i];
                u = i;
            }
        }

        if (u == -1) break;
        visited[u] = true;

        for (int v = 0; v < V; v++)
        {
```

```

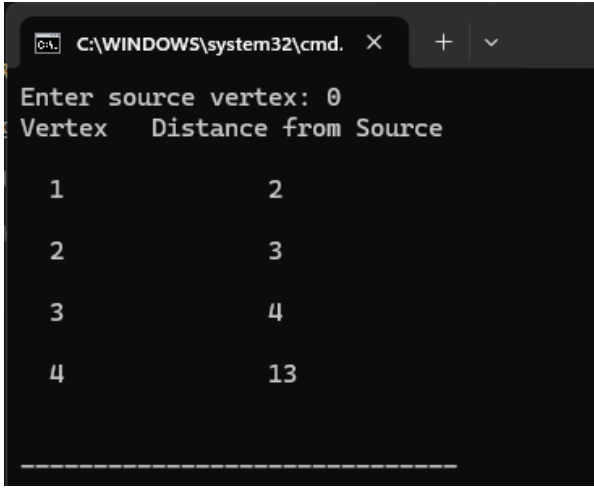
        if (visited[v] == false && graph[u][v] != 0 && dist[u] +
graph[u][v] < dist[v])
        {
            dist[v] = dist[u] + graph[u][v];
        }
    }
}

cout << "Vertex    Distance from Source" << endl;
cout << endl;
for (int i = 0; i < V; i++)
{
    if (i == source) continue;
    cout << "    " << i << "                " << dist[i] << endl;
    cout << endl;
}

return 0;
}

```

My output, I choose 0 as source:



```

C:\WINDOWS\system32\cmd.  X  +  v
Enter source vertex: 0
Vertex    Distance from Source

1          2

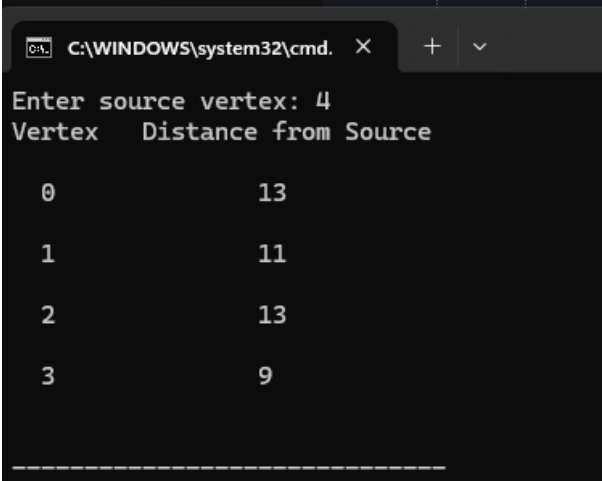
2          3

3          4

4         13

-----

```



```

C:\WINDOWS\system32\cmd.  X  +  v
Enter source vertex: 4
Vertex    Distance from Source

0          13

1          11

2          13

3           9

-----

```

Problem 2:

```
#include <iostream>
#include <vector>
#include <iomanip>
using namespace std;

int main()
{
    int n = 6;
    int C = 18;

    int weight[] = {10, 7, 8, 4, 5, 6};
    int value[] = {100, 63, 70, 40, 55, 59};

    vector<vector<int>> dp(n + 1, vector<int>(C + 1, 0));

    for (int i = 1; i <= n; i++)
    {
        for (int w = 0; w <= C; w++)
        {
            if (weight[i - 1] <= w)
                dp[i][w] = max(dp[i - 1][w], dp[i - 1][w - weight[i - 1]] +
value[i - 1]);
            else
                dp[i][w] = dp[i - 1][w];
        }
    }

    cout << "Capacity: " << C << endl << endl;

    cout << "DP Table:" << endl;
    cout << setw(6) << "w->";
    for (int w = 0; w <= C; w++)
        cout << setw(5) << w;
    cout << endl;
    cout << string(6 + 5 * (C + 1), '-') << endl;
    for (int i = 0; i <= n; i++)
    {
        cout << "i=" << i << setw(3) << " ";
        for (int w = 0; w <= C; w++)
            cout << setw(5) << dp[i][w];
        cout << endl;
    }

    cout << endl << "Maximum value: $" << dp[n][C] << endl;

    cout << endl << "Items selected:" << endl;
```

```

    cout << left << setw(10) << "Item" << setw(10) << "Weight" << setw(10) <<
"Value" << endl;
    cout << string(30, '-') << endl;

    int w = C;
    int totalWeight = 0;
    for (int i = n; i >= 1; i--)
    {
        if (dp[i][w] != dp[i - 1][w])
        {
            cout << left << setw(10) << i << setw(10) << weight[i - 1] << "$"
<< value[i - 1] << endl;
            totalWeight += weight[i - 1];
            w -= weight[i - 1];
        }
    }

    cout << string(30, '-') << endl;
    cout << "Total weight: " << totalWeight << endl;
    cout << "Total value: $" << dp[n][C] << endl;
}

```

My output:

```

C:\WINDOWS\system32\cmd. X + v
Capacity: 18
DP Table:
w->  0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18
-----
i=0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
i=1   0   0   0   0   0   0   0   0   0   0  100  100  100  100  100  100  100  100
i=2   0   0   0   0   0   0   0   63  63  63  100  100  100  100  100  100  100  163  163
i=3   0   0   0   0   0   0   0   63  70  70  100  100  100  100  100  133  133  163  170
i=4   0   0   0   0   40  40  40  63  70  70  100  103  110  110  140  140  140  163  170
i=5   0   0   0   0   40  55  55  63  70  95  100  103  118  125  140  155  158  165  170
i=6   0   0   0   0   40  55  59  63  70  95  100  114  118  125  140  155  159  165  177

Maximum value: $177

Items selected:
Item    Weight    Value
-----
6        6      $59
5        5      $55
2        7      $63
-----

Total weight: 18
Total value: $177

```