WEEK 9

1)From a given vertex in a weighted connected graph, find shortest paths to other vertices using dijkstra's algorithm.

CODE:

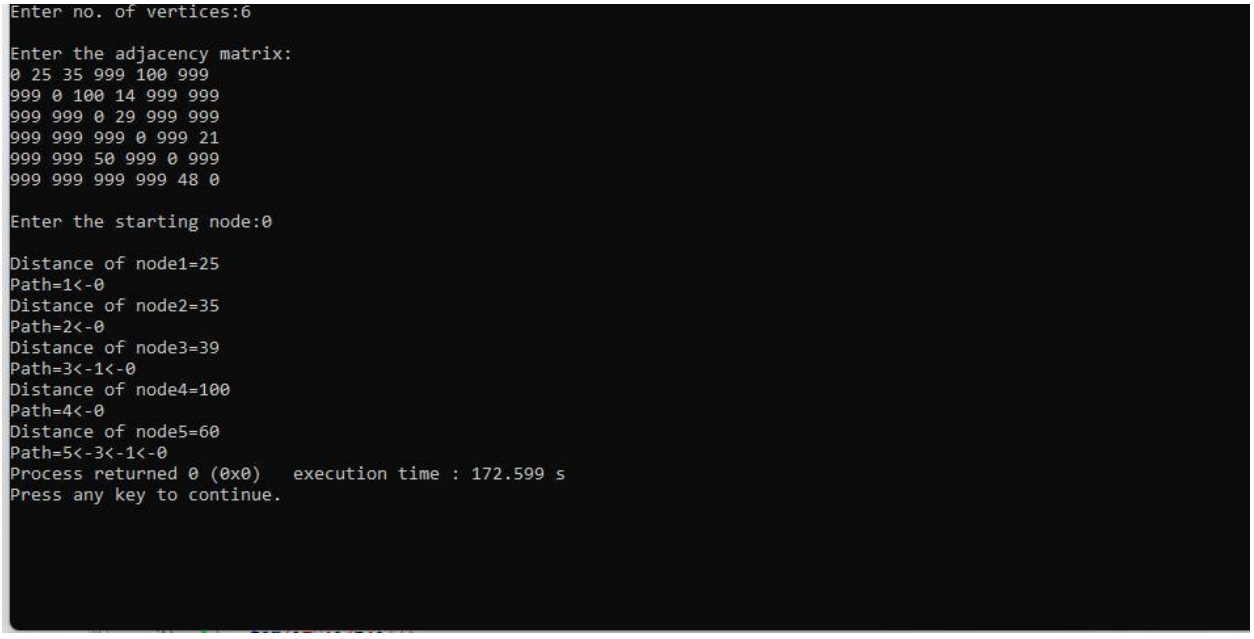
```
#include<stdio.h>
#include<conio.h>
#define INFINITY 999
#define MAX 10

void dijkstra(int G[MAX][MAX],int n,int startnode);
int main()
{
  int G[MAX][MAX],i,j,n,u;
  printf("Enter no. of vertices:");
  scanf("%d",&n);
  printf("\nEnter the adjacency matrix:\n");
  for(i=0;i<n;i++)
  for(j=0;j<n;j++)
  scanf("%d",&G[i][j]);
  printf("\nEnter the starting node:");
  scanf("%d",&u);
  dijkstra(G,n,u);
```

```
  return 0;
}
void dijkstra(int G[MAX][MAX],int n,int startnode)
{
  int cost[MAX][MAX],distance[MAX],pred[MAX];
  int visited[MAX],count,mindistance,nextnode,i,j;
  for(i=0;i<n;i++)
  for(j=0;j<n;j++)
  if(G[i][j]==0)
  cost[i][j]=INFINITY;
  else
  cost[i][j]=G[i][j];
  for(i=0;i<n;i++)
  {
    distance[i]=cost[startnode][i];
    pred[i]=startnode;
    visited[i]=0;
  }
  distance[startnode]=0;
  visited[startnode]=1;
  count=1;
  while(count<n-1)
  {
```

```
    mindistance=INFINITY;
    for(i=0;i<n;i++)
    if(distance[i]<mindistance&&!visited[i])
    {
      mindistance=distance[i];
      nextnode=i;
    }
    visited[nextnode]=1;
    for(i=0;i<n;i++)
    if(!visited[i])
    if(mindistance+cost[nextnode][i]<distance[i])
    {
      distance[i]=mindistance+cost[nextnode][i]
      ; pred[i]=nextnode;
    }
    count++;
}

for(i=0;i<n;i++)
if(i!=startnode)
{
  printf("\nDistance of node%d=%d",i,distance[i]);
```

```
  printf("\nPath=%d",i);
  j=i;
  do
  {
    j=pred[j];
    printf("<-%d",j);
  }
  while(j!=startnode);
}
}
```

OUTPUT:



2)Implement the “N-Queens” problem using Backtracking.

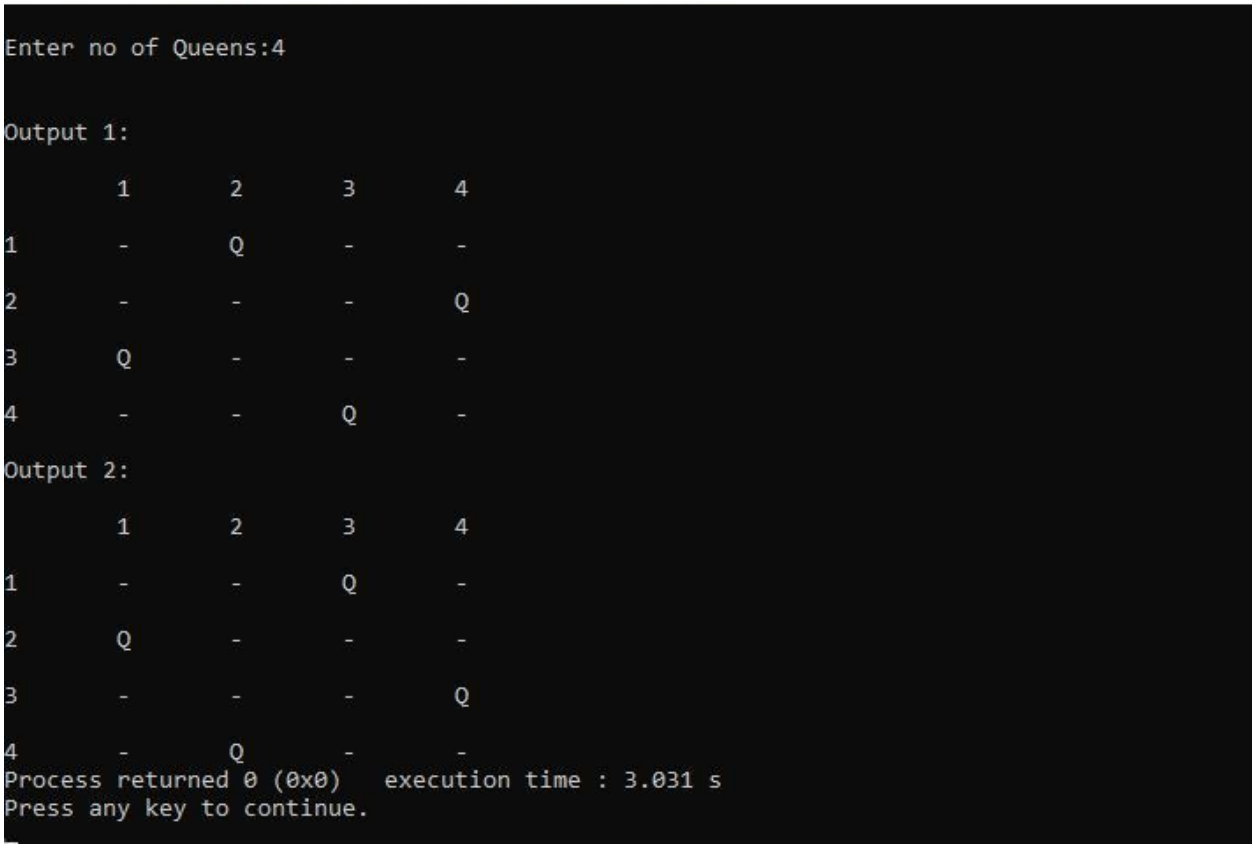
CODE:

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

int board[20],count;

int main()
{
int n,i,j;
void queen(int row,int n);
printf("\n\nEnter no of Queens:");
scanf("%d",&n);
queen(1,n);
return 0;
}

void print(int n)
{
int i,j;
printf("\n\nOutput %d:\n\n",++count);

 for(i=1;i<=n;++i)
  printf("\t%d",i);

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

```
  printf("\n\n%d",i);
  for(j=1;j<=n;++j)
  {
   if(board[i]==j)
    printf("\tQ");
   else
    printf("\t-");
  }
}
}
int place(int row,int column)
{
int i;
for(i=1;i<=row-1;++i)
{
  if(board[i]==column)
   return 0;
  else
   if(abs(board[i]-column)==abs(i-row))
    return 0;
}

return 1;
}
```

```
void queen(int row,int n)
{
int column;
for(column=1;column<=n;++column)
{
  if(place(row,column))
  {
   board[row]=column;
   if(row==n)
    print(n);
   else
    queen(row+1,n);
  }
}
}
```

OUTPUT:


Enter no of Queens:4
Output 1:
1 2 3 4
1 - Q - -
2 - - - Q
3 Q - - -
4 - - Q -
Output 2:
1 2 3 4
1 - - Q -
2 Q - - -
3 - - - Q
4 - Q - -
Process returned 0 (0x0) execution time : 3.031 s
Press any key to continue.