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Quicksort

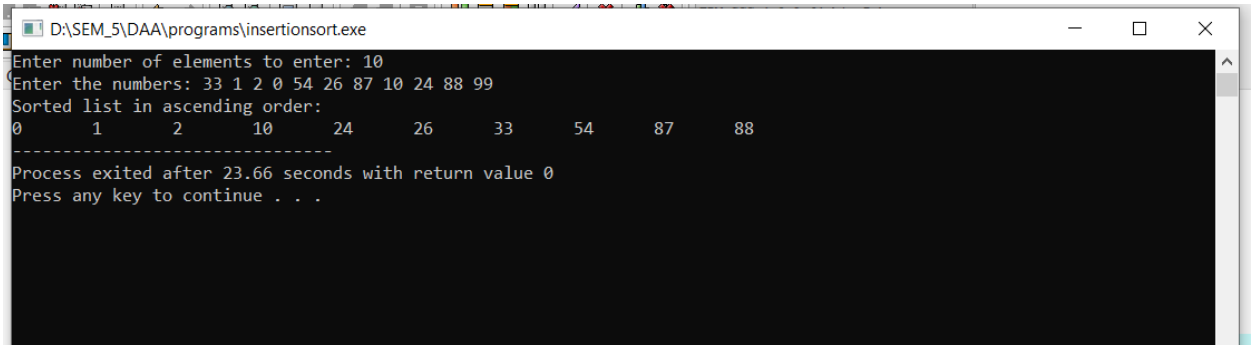
```
#include<stdio.h>
void quicksort(int number[25],int first, int last)
{
int i, j, pivot, temp;
if(first<last)
{
pivot=first;
i=first;
j=last;
while(i<j)
{
while(number[i]<=number[pivot]&&i<last)
i++;
while(number[j]>number[pivot])
j--;
if(i<j)
{
temp=number[i];
number[i]=number[j];
number[j]=temp;
}
}
temp=number[pivot];
number[pivot]=number[j];
number[j]=temp;
quicksort(number,first,j-1);
quicksort(number,j+1,last);
}
}
int main(){
int i, count, number[25];
printf("Enter the number of elements: ");
scanf("%d",&count);
printf("Enter %d elements: ", count);
for(i=0;i<count;i++)
scanf("%d",&number[i]);
quicksort(number,0,count-1);
printf("Sorted elements: ");
for(i=0;i<count;i++)
printf(" %d",number[i]);
return 0;
}
```

D:\SEM_5\DAA\programs\quicksort.exe

```
Enter the number of elements: 7
Enter 7 elements: 3
4
5
6
1
2
0
Sorted elements:  0 1 2 3 4 5 6
--------------------------------
Process exited after 8.543 seconds with return value 0
Press any key to continue . . .
```

Insertion Sort

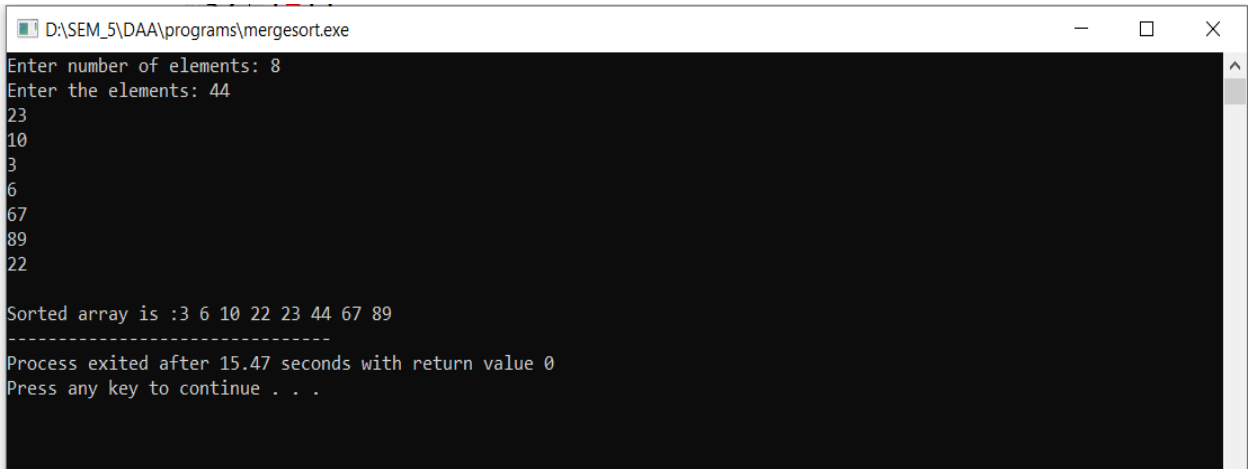
```
#include<stdio.h>
int main()
{
int a[100],i,j,n,s;
printf("Enter number of elements to enter: ");
scanf("%d",&n);
printf("Enter the numbers: ",n);
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
for (i=1;i<n;i++)
{ s=a[i];
}
j=i-1;
while(j>=0 && a[j]>s)
{
a[j+1]=a[j];
j=j-1;
a[j+1]=s;
}
}
printf("Sorted list in ascending order:\n");
for(i=0;i<n;i++)
{
printf("%d\t", a[i] );
}
```



Merge Sort

```
#include<stdio.h>
void mergesort(int a[],int i,int j);
void merge(int a[],int i1,int j1,int
i2,int j2);
int main()
{
int a[30],n,i;
printf("Enter number of elements:");
scanf("%d",&n);
printf("Enter the elements:");
for(i=0;i<n;i++)
scanf("%d",&a[i]);
mergesort(a,0,n-1);
printf("\nSorted array is :");
for(i=0;i<n;i++)
printf("%d ",a[i]);
return 0;
}
void mergesort(int a[],int i,int j)
{
int mid;
if(i<j)
{
mid=(i+j)/2;
mergesort(a,i,mid);
mergesort(a,mid+1,j);
merge(a,i,mid,mid+1,j); }
}
void merge(int a[],int i1,int j1,int
i2,int j2)
{
int temp[50];
int i,j,k;
i=i1;
j=i2;
k=0;
while(i<=j1 && j<=j2)
{
if(a[i]<a[j])
temp[k++]=a[i++];
else
temp[k++]=a[j++];
}
while(i<=j1)
temp[k++]=a[i++];
while(j<=j2)
temp[k++]=a[j++];
for(i=i1,j=0;i<=j2;i++,j++)
```

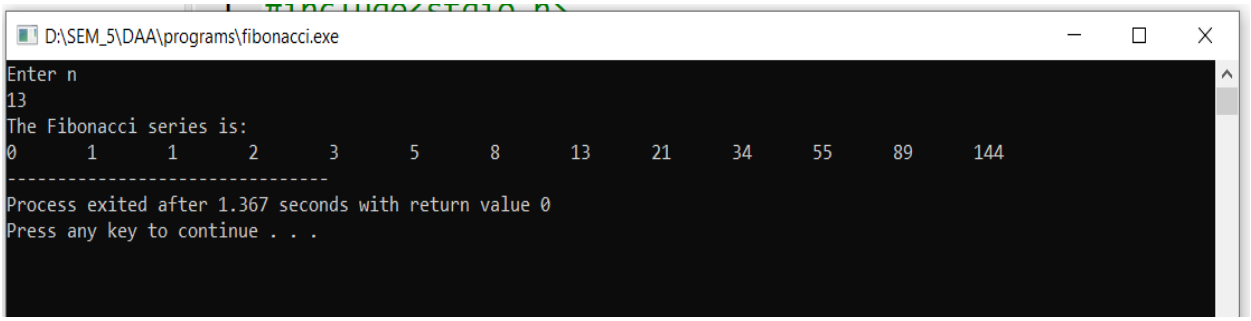
```
a[i]=temp[j];
}
```


D:\SEM_5\DAA\programs\mergesort.exe
Enter number of elements: 8
Enter the elements: 44
23
10
3
6
67
89
22
Sorted array is :3 6 10 22 23 44 67 89

Process exited after 15.47 seconds with return value 0
Press any key to continue . . .

Fibonacci

```
#include<stdio.h>
#include<conio.h>
int main()
{
	int a=0,b=1;
	int c,n,i;
	printf("Enter n\n");
	scanf("%d",&n);
	printf("The Fibonacci series is: \n");
	for(i=0;i<n;i++)
	{
		printf("%d\t",a);
		c = a+b;
		a=b;
		b=c;
	}
}
```



Binary Search

```
#include <stdio.h>

int main()

{

int c, first, last, middle, n, search,
array[100];

printf("Enter number of elements to
be entered: \n");

scanf("%d", &n);

printf("Enter %d numbers in sorted
order: \n", n);

for (c = 0; c < n; c++)

scanf("%d", &array[c]);

printf("Enter value to search: \n");

scanf("%d", &search);

first = 0;

last = n - 1;

middle = (first+last)/2;

while (first <= last)

{

if (array[middle] < search)

first = middle + 1;

else if (array[middle] == search)

{

printf("%d found at location %d.\n",
search, middle+1);

break;

}

else

last = middle - 1;

middle = (first + last)/2;

}

if (first > last)

printf("Not found! %d isn't present in
the list.\n", search);

return 0;

}
```

D:\SEM_5\DAA\programs\binarysearch.exe

```
Enter number of elements to be entered:
10
Enter 10 numbers in sorted order:
12 17 29 33 46 58 65 80 95 98
Enter value to search:
65
65 found at location 7.

--------------------------------
Process exited after 23.05 seconds with return value 0
Press any key to continue . . .
```

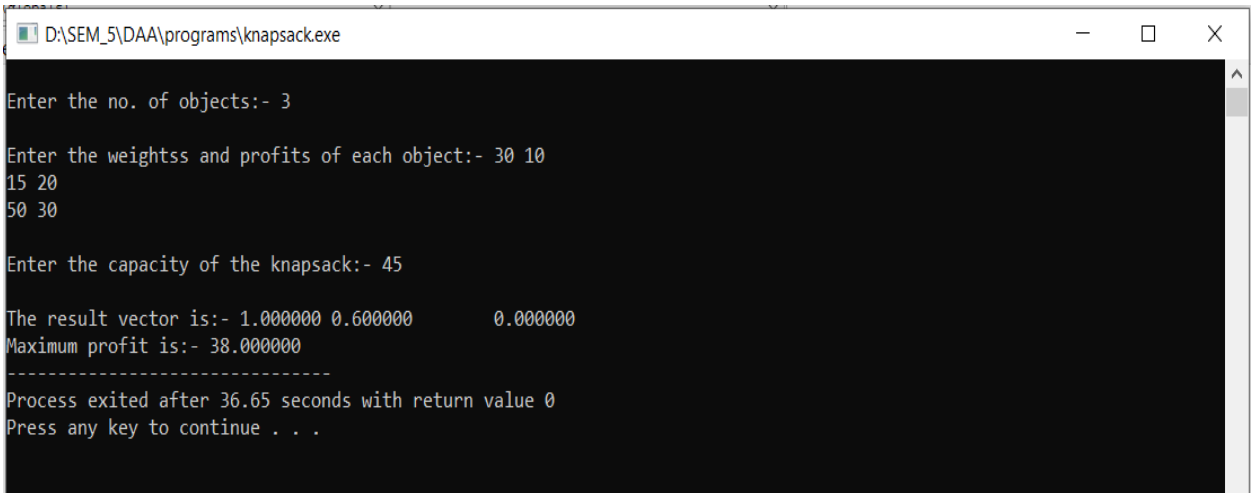
D:\SEM_5\DAA\programs\binarysearch.exe

```
Enter number of elements to be entered:
10
Enter 10 numbers in sorted order:
12
33
56
76
78
79
85
82
101
111
Enter value to search:
86
Not found! 86 isn't present in the list.

--------------------------------
Process exited after 19.52 seconds with return value 0
Press any key to continue . . .
```

Fractional Knapsack

```
# include<stdio.h>

void knapsack(int n, float weight[],
float profit[], float capacity)

{

float x[20], tp = 0;

int i, j, u;

u = capacity;

for (i = 0; i < n; i++)

x[i] = 0.0;

for (i = 0; i < n; i++)

{

if (weight[i] > u)

break;

else {

x[i] = 1.0;

tp = tp + profit[i];

u = u - weight[i];

}

}

if (i < n)

x[i] = u / weight[i];

tp = tp + (x[i] * profit[i]);

printf("\nThe result vector is:- ");

for (i = 0; i < n; i++)

printf("%f\t", x[i]);

printf("\nMaximum profit is:- %f",
tp);

}

int main()

{

float weight[20], profit[20], capacity;

int num, i, j;

float ratio[20], temp;

printf("\nEnter the no. of objects:- ");

scanf("%d", &num);

printf("\nEnter the weightss and
profits of each object:- ");

for (i = 0; i < num; i++) {

scanf("%f %f", &weight[i],
&profit[i]);

}

printf("\nEnter the capacity of the
knapsack:- ");

scanf("%f", &capacity);

for (i = 0; i < num; i++)

{

ratio[i] = profit[i] / weight[i];

}

for (i = 0; i < num; i++)
```

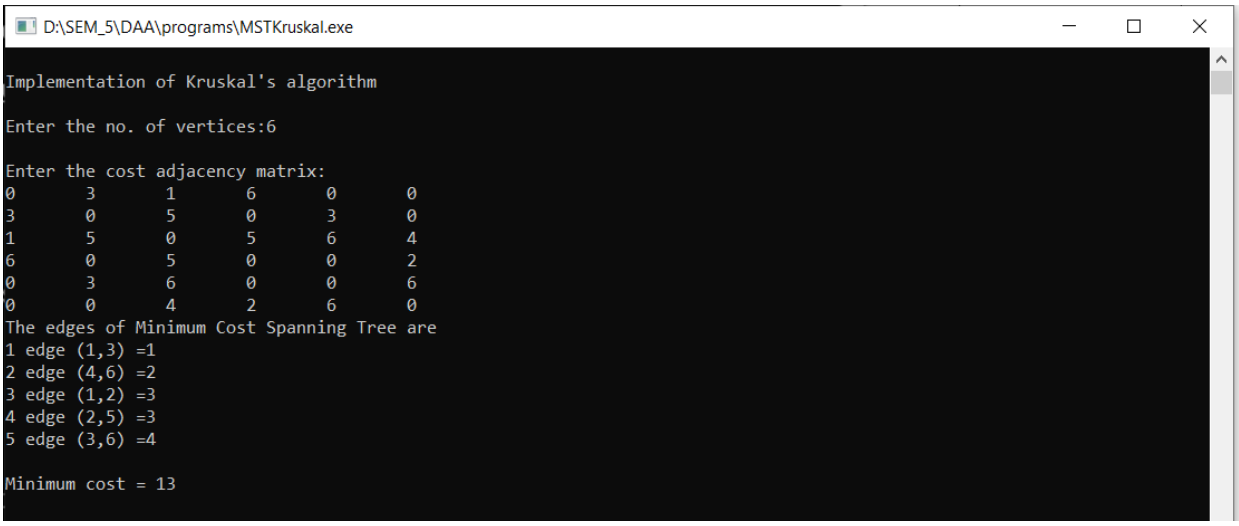
```
{
for (j = i + 1; j < num; j++)
{
if (ratio[i] < ratio[j])
{
temp = ratio[j];
ratio[j] = ratio[i];
ratio[i] = temp;
temp = weight[j];
weight[j] = weight[i];
weight[i] = temp;
temp = profit[j];
profit[j] = profit[i];
profit[i] = temp;
}}}
knapsack(num, weight, profit, capacity);
return(0);
}
```



Kruskal’s Algorithm

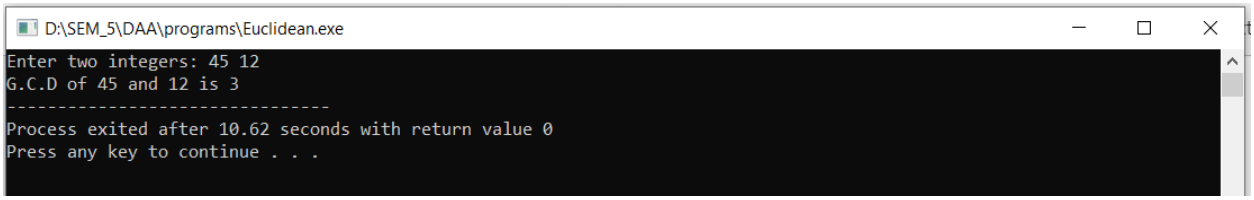
```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
int i,j,k,a,b,u,v,n,ne=1;
int
min,mincost=0,cost[9][9],parent[9];
int find(int);
int uni(int,int);
int main()
{

printf("\nImplementation of Kruskal's
algorithm\n");
printf("\nEnter the no. of vertices:");
scanf("%d",&n);
printf("\nEnter the cost adjacency
matrix:\n");
for(i=1;i<=n;i++)
{
for(j=1;j<=n;j++)
{
scanf("%d",&cost[i][j]);
if(cost[i][j]==0)
cost[i][j]=999;
}
}
printf("The edges of Minimum Cost
Spanning Tree are\n");
while(ne < n)
{
for(i=1,min=999;i<=n;i++)
{
for(j=1;j <= n;j++)
{
if(cost[i][j] < min)
{
min=cost[i][j];
a=u=i;
b=v=j;
}
}
}
u=find(u);
v=find(v);
if(uni(u,v))
{
printf("%d edge (%d,%d)
=%d\n",ne++,a,b,min);
```

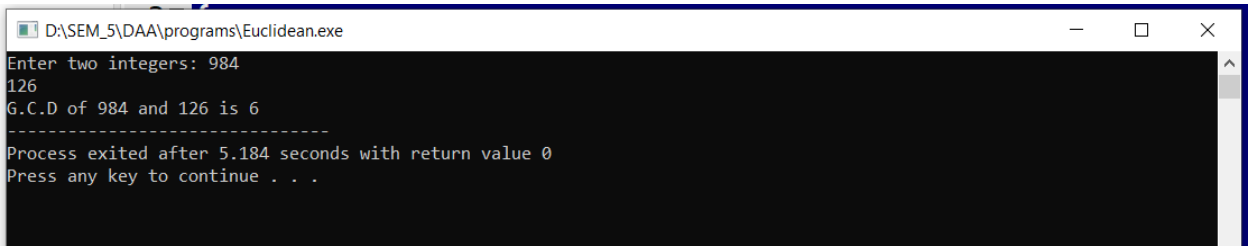
```
mincost +=min;
}
cost[a][b]=cost[b][a]=999;
}
printf("\nMinimum cost =
%d\n",mincost);
getch();
}
int find(int i)
{
while(parent[i])
i=parent[i];
return i;
}
int uni(int i,int j)
{
if(i!=j)
{
parent[j]=i;
return 1;
}
return 0;
}
```



Euclidean Algorithm

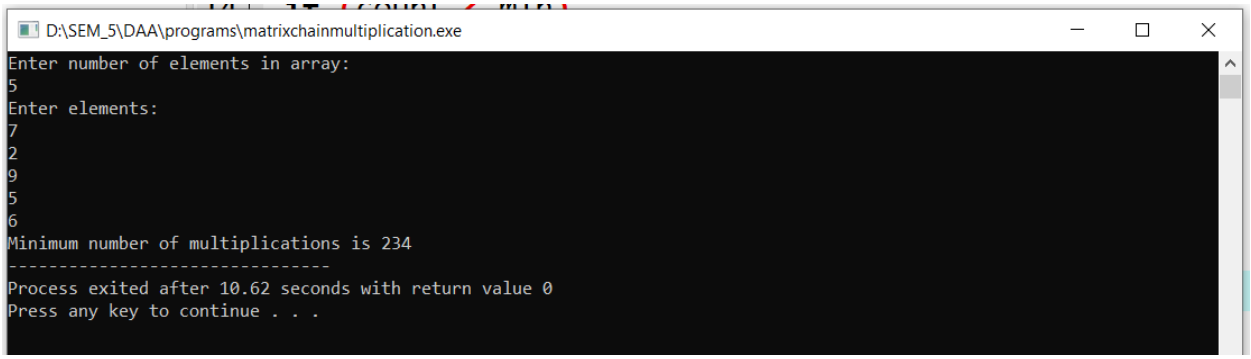
```
#include <stdio.h>
int main()
{
int n1, n2, i, gcd;
printf("Enter two integers: ");
scanf("%d %d", &n1, &n2);
for(i=1; i <= n1 && i <= n2; ++i)
{
if(n1%i==0 && n2%i==0)
gcd = i;
}
printf("G.C.D of %d and %d is %d", n1, n2, gcd);
return 0;
}
```





Matrix Chain Multiplication

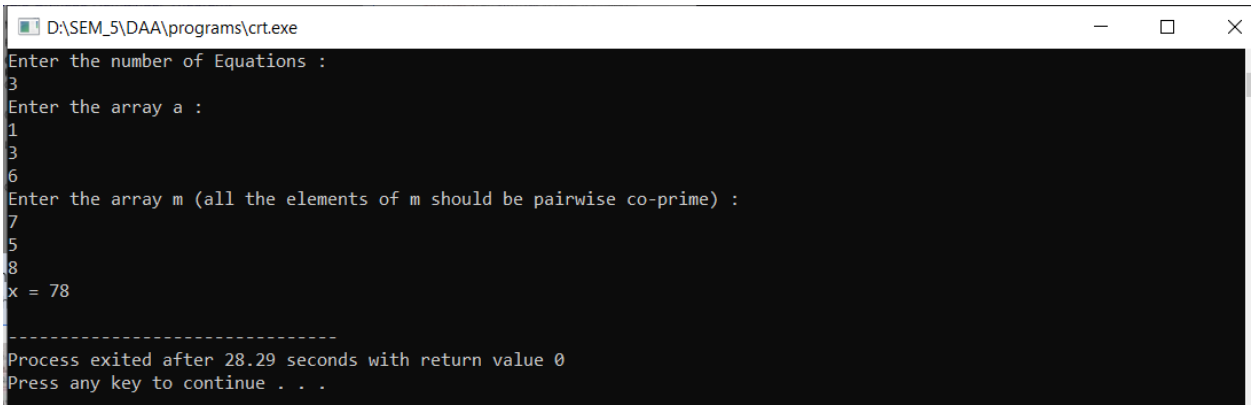
```
#include <limits.h>
#include <stdio.h>
int MatrixChainOrder(int p[], int i, int j)
{
if (i == j)
return 0;
int k;
int min = INT_MAX;
int count;
for (k = i; k < j; k++)
{ count = MatrixChainOrder(p, i, k)
+ MatrixChainOrder(p, k + 1, j)
+ p[i - 1] * p[k] * p[j];
if (count < min)
min = count;
}
return min; }
int main()
{
int i,n,arr[100];
printf("Enter number of elements in array: \n");
scanf("%d",&n);
printf("Enter elements:\n");
for(i=0;i<n;i++)
scanf("%d",&arr[i]);
printf("Minimum number of multiplications is %d ",
MatrixChainOrder(arr, 1, n - 1));
getchar();
return 0;
}
```



Chinese Remainder Theorem

```
#include<stdio.h>
#include<stdlib.h>
long long int MMI_BF(long long int e,long long int mod)
{
long long int i;
for(i=1;i<mod;i++)
if((e*i)%mod==1)
return i;
}
int main()
{
long long int i,n,*a,*b,*m,M,*Marray,answer;
printf("Enter the number of Equations : \n");
scanf("%lld",&n);
a=(long long int*)malloc(sizeof(long long int)*n);
m=(long long int*)malloc(sizeof(long long int)*n);
Marray=(long long int*)malloc(sizeof(long long int)*n);
printf("Enter the array a :\n");
for(i=0;i<n;i++)
scanf("%lld",&a[i]);
printf("Enter the array m (all the elements of m should be pairwise co-prime) :\n");
for(i=0;i<n;i++)
scanf("%lld",&m[i]);
M=1;
```

```
for(i=0;i<n;i++)
M*=m[i];
for(i=0;i<n;i++)
Marray[i]=M/m[i];
answer=0;
for(i=0;i<n;i++)
answer = (answer + ((a[i] * Marray[i])%M *
MMI_BF(Marray[i],m[i]))%M)%M;
printf("x = %lld\n",answer);
return 0;
}
```



N-Queen Problem

```
#define N 4
#include <stdbool.h>
#include <stdio.h>
void printSolution(int board[N][N])
{
for (int i = 0; i < N; i++) {
for (int j = 0; j < N; j++)
printf(" %d ", board[i][j]);
printf("\n");
}
}
bool isSafe(int board[N][N], int row,
int col)
{
int i, j;
for (i = 0; i < col; i++)
if (board[row][i])
return false;
for (i = row, j = col; i >= 0 && j >= 0;
i--, j--)
if (board[i][j])
return false;
for (i = row, j = col; j >= 0 && i < N;
i++, j--)
if (board[i][j])
return false;
return true; }
bool solveNQUtil(int board[N][N], int
col)
{
if (col >= N)
return true;
for (int i = 0; i < N; i++)
{
if (isSafe(board, i, col))
{
board[i][col] = 1;
if (solveNQUtil(board, col + 1))
return true;
board[i][col] = 0;
}
}
return false;
}
bool solveNQ()
{
int board[N][N] = { { 0, 0, 0, 0 },{ 0,
0, 0, 0 }, { 0, 0, 0, 0 },{ 0, 0, 0, 0 } };
```

```
if (solveNQUtil(board, 0) == false)
{
printf("Solution does not exist");
return false;
}
printSolution(board);
return true;
}
int main()
{
solveNQ();
return 0;
}
```