Algoritmi i programiranje

- Računske vežbe VIII termin -

Sadržaj

- 4 zadatka
- Napomena:
  - Matrice (dvodimenzionalna polja)
    - Referenca:235. strana, poglavlje 5.2, Uvod u programiranje i programski jezik C, dr Vladimir Ćirić

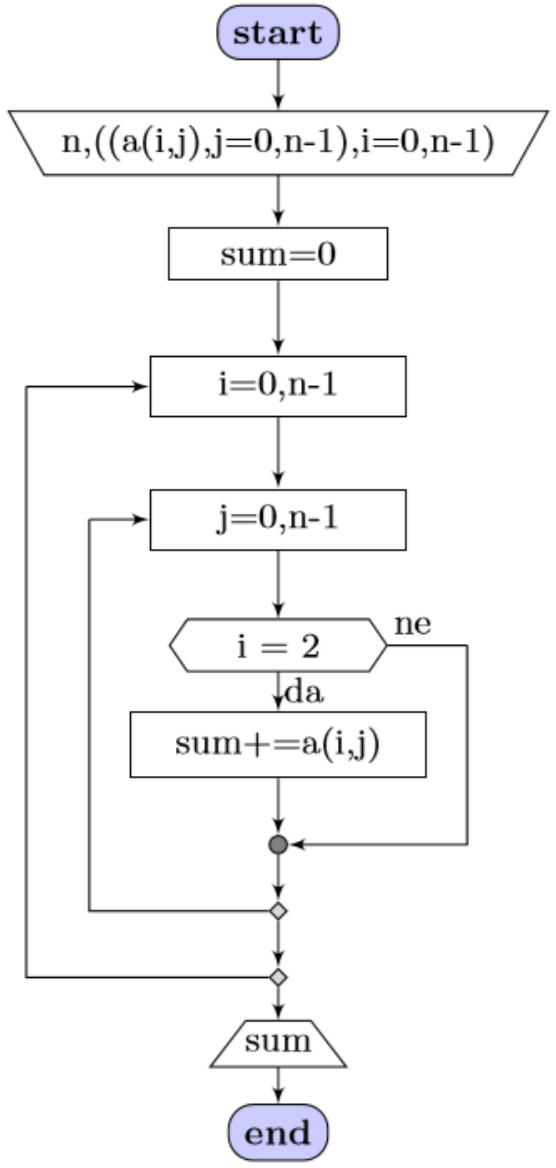
Zadatak 1

Nacrtati strukturni dijagram toka algoritma i na programskom jeziku C napisati strukturni program koji određuje i prikazuje zbir elemenata

a) 3. vrste,
b) 2. kolone,
c) na glavnoj dijagonali,
d) na sporednoj dijagonali,
e) iznad glavne dijagonale,
f) ispod sporedne dijagonale.

kvadratne matrice A_{NxN}, čiji red i elemente zadaje korisnik.

Zadatak 1 – Rešenje a)




```c
#include <stdio.h>
void main()
{
        int i,j,n,a[20][20],sum;
        scanf("%d",&n);
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        scanf("%d",&a[i][j]);
        sum = 0;
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        if( i == 2 )
                                sum+=a[i][j];
        printf("Suma elemenata je: %d\n", sum);
}
```

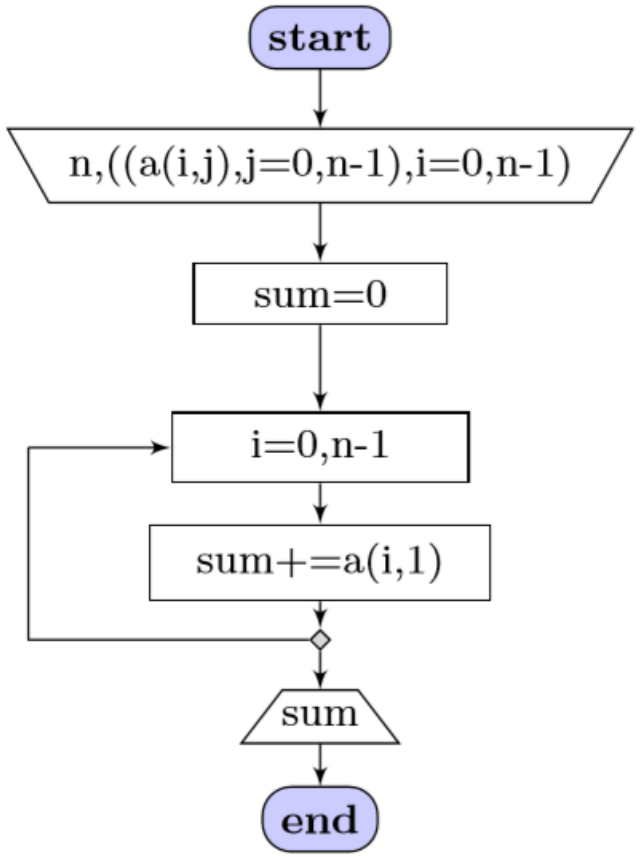
Ulaz

```
4
1 2 3 4
5 6 7 8
1 2 3 4
5 6 7 8
```

Izlaz

```
Suma elemenata je: 10
```

Zadatak 1 – Rešenje b)




```c
#include <stdio.h>
void main()
{
        int i,j,n,a[20][20],sum;
        scanf("%d",&n);
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        scanf("%d",&a[i][j]);
        sum = 0;
        for(i=0;i<n;i++)
                sum+=a[i][1];
        printf("Suma elemenata je: %d\n", sum);
}
```

Ulaz

```
4
1 2 3 4
5 6 7 8
1 2 3 4
5 6 7 8
```

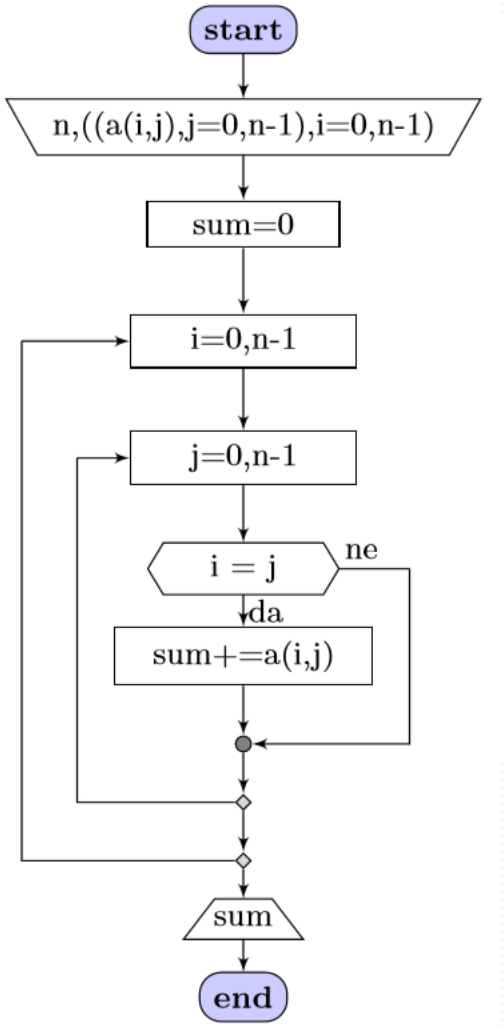
⇒

Izlaz

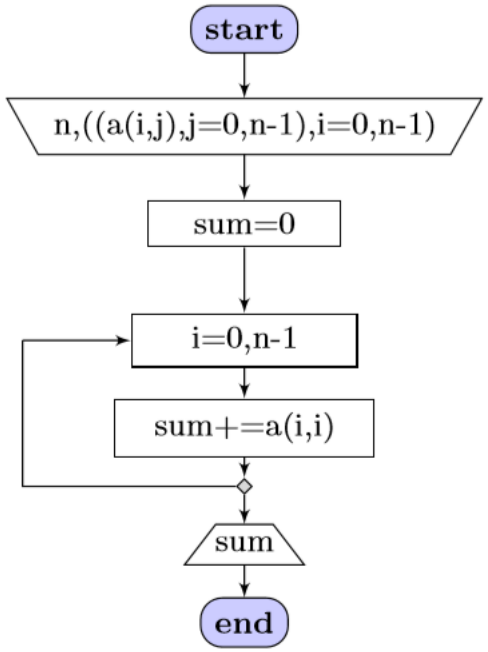
```
Suma elemenata je: 16
```

Zadatak 1 – Rešenje c)

varijanta 1



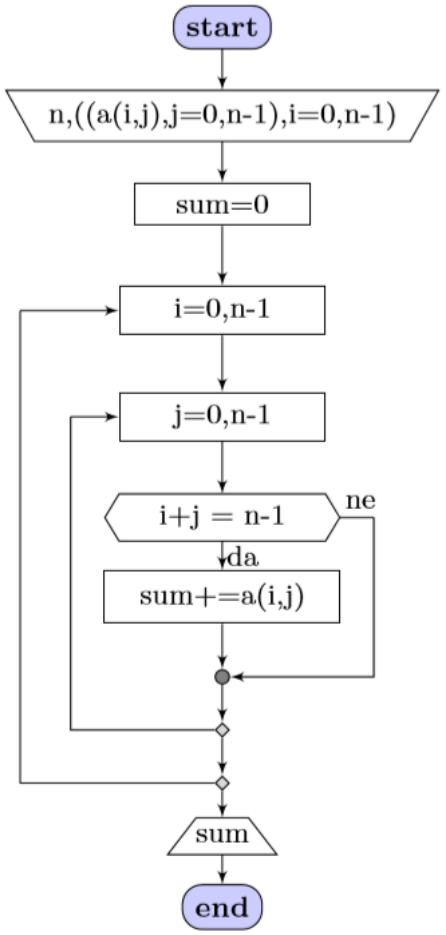
varijanta 2



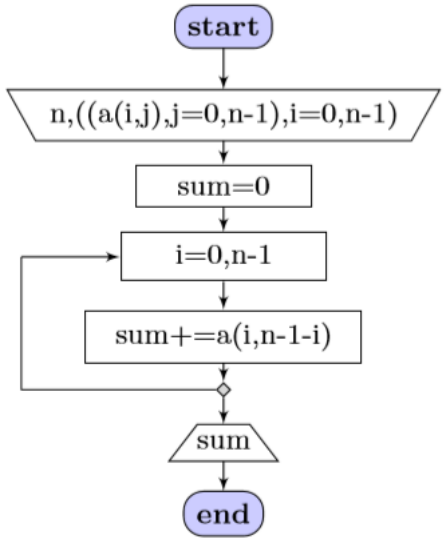

```
#include <stdio.h>
void main()
{
        int i,j,n,a[20][20],sum;
        scanf("%d",&n);
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        scanf("%d",&a[i][j]);
      sum = 0;
      for(i=0;i<n;i++)
              for(j=0;j<n;j++)
                      if( i == j )
                              sum+=a[i][j];
      printf("Suma elemenata je: %d\n", sum);
}
```

Zadatak 1 – Rešenje d)

varijanta 1

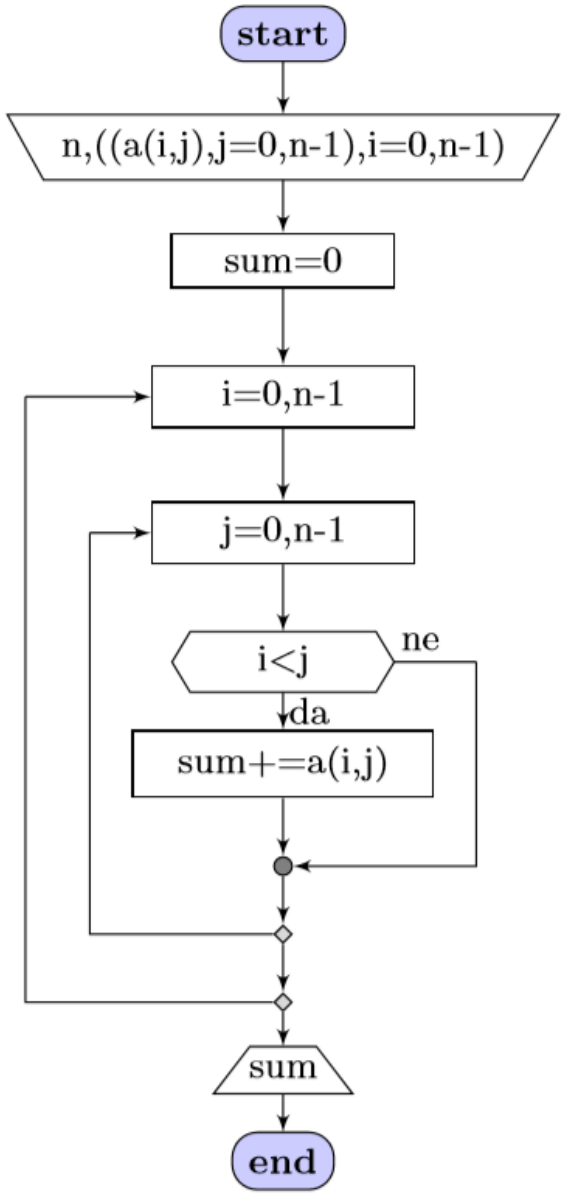


varijanta 2



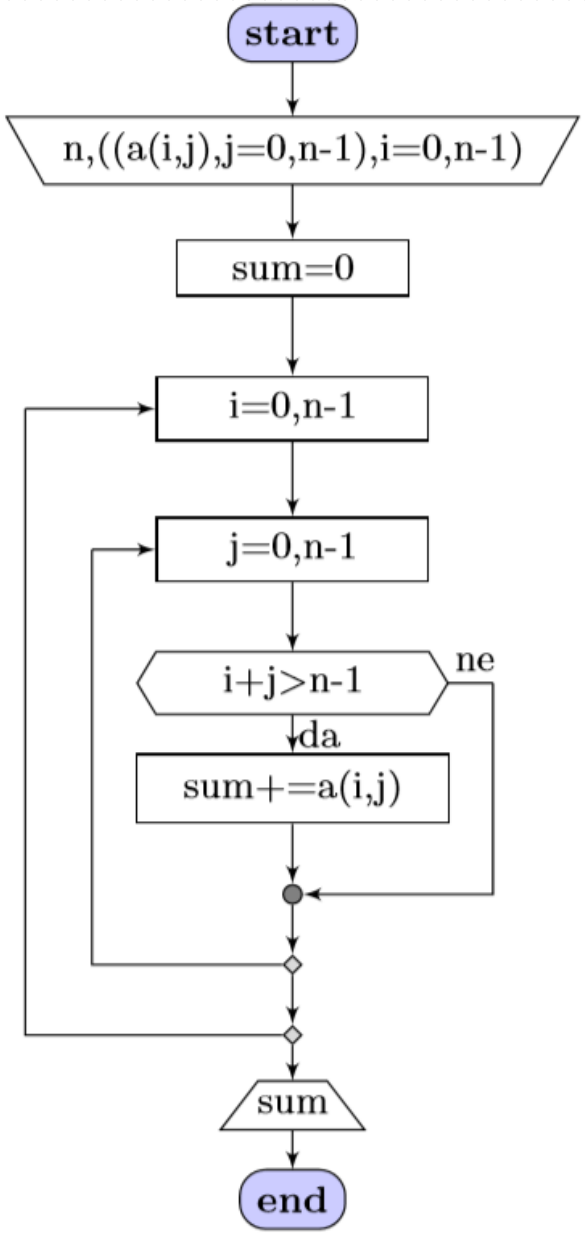

```c
#include <stdio.h>
void main()
{
        int i,j,n,a[20][20],sum;
        scanf("%d",&n);
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        scanf("%d",&a[i][j]);
        sum = 0;
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)

                        if( i+j == n-1 )
                                sum+=a[i][j];
        printf("Suma elemenata je: %d\n", sum);
}
```

Zadatak 1 – Rešenje e)




```c
#include <stdio.h>
void main()
{
        int i,j,n,a[20][20],sum;
        scanf("%d",&n);
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        scanf("%d",&a[i][j]);
        sum = 0;
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        if( i < j )
                                sum+=a[i][j];
        printf("Suma elemenata je: %d\n", sum);
}
```

Zadatak 1 – Rešenje f)




```c
#include <stdio.h>
void main()
{
        int i,j,n,a[20][20],sum;
        scanf("%d",&n);
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        scanf("%d",&a[i][j]);
        sum = 0;
        for(i=0;i<n;i++)
                for(j=0;j<n;j++)
                        if( i+j > n-1)
                                sum+=a[i][j];
        printf("Suma elemenata je: %d\n", sum);
}
```

Ulaz

```
4
1 2 3 4
5 6 7 8
1 2 3 4
5 6 7 8
```

⇒

Izlaz

```
Suma elemenata je: 36
```

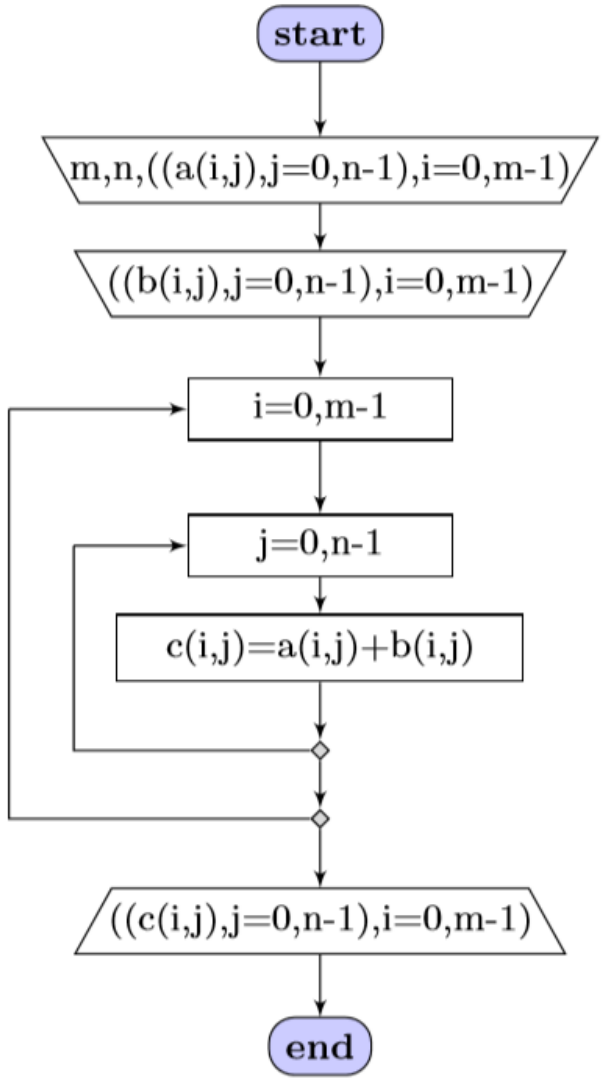
Zadatak 2

Nacrtati strukturni dijagram toka algoritma i na programskom jeziku C napisati strukturni program za sabiranje matrica

$$C_{MxN} = A_{MxN} + B_{MxN}.$$

Dimenzije matrica i vrednosti elemenata matrica A i B zadaje korisink. Napomena: zbir matrica definisan je kao zbir odgovarajućih elemenata, t.j. $c_{i,j} = a_{i,j} + b_{i,j}$, za svako $i = \{0,1,2,...,M-1\}$ i $j = \{0,1,2,...,N-1\}$.

Zadatak 2 - Rešenje




```c
#include<stdio.h>
void main()
{
        int i,j,n,m,a[20][20],b[20][20],c[20][20];
        printf("Unesite broj vrsta matrica:\n");
        scanf("%d",&m);
        printf("Unesite broj kolona matrica:\n");
        scanf("%d",&n);
        printf("Unesite elemente prve matrice:\n");
        for(i=0;i<m;i++)
                for(j=0;j<n;j++)
                        scanf("%d",&a[i][j]);
        printf("Unesite elemente druge matrice:\n");
        for(i=0;i<m;i++)
                for(j=0;j<n;j++)
                        scanf("%d",&b[i][j]);
        for(i=0;i<m;i++)
                for(j=0;j<n;j++)
                        c[i][j] = a[i][j] + b[i][j];
        printf("Prikaz rezultujuce matrice:\n");
        for(i=0;i<m;i++)
        {
                for(j=0;j<n;j++)
                        printf("%2d ",c[i][j]);
                printf("\n");
        }
}
```

Ulaz

```
4
5
 1  2  3  4  5
 6  7  8  9 10
11 12 13 14 15
16 17 18 19 20

21 22 23 24 25
26 27 28 29 30
31 32 33 34 35
36 37 38 39 40
```

Izlaz

```
Unesite broj vrsta matrica:
Unesite broj kolona matrica:
Unesite elemente prve matrice:
Unesite elemente druge matrice:
Prikaz rezultujuce matrice:
22 24 26 28 30
32 34 36 38 40
42 44 46 48 50
52 54 56 58 60
```

Zadatak 3

Nacrtati strukturni dijagram toka algoritma i na programskom jeziku C napisati strukturni program koji u matrici A_{NxN} vrši zamenu mesta elementima

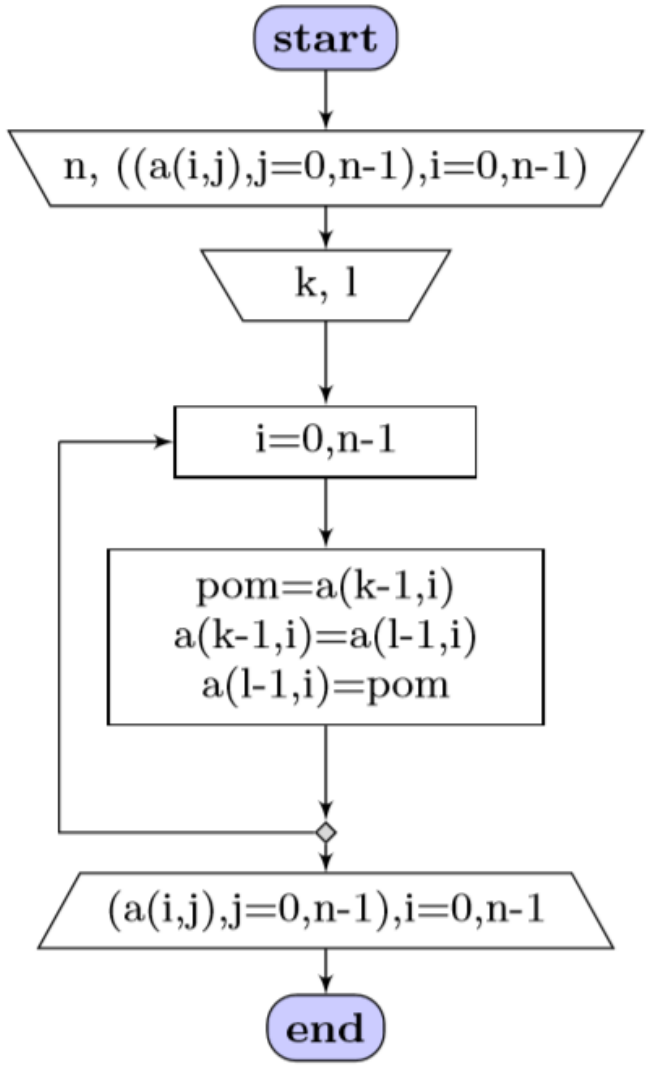
a) k-te i l-te vrste,

b) k-te i l-te kolone,

c) k-te vrste i k-te kolone.

Dimenziju matrice N, vrednosti elemenata matrice $a_{i,j}$ i parametre transformacije k i l zadaje korisnik. Prikazati matricu nakon transformacije.

Zadatak 3 – Rešenje a)




```c
#include <stdio.h>
void main()
{
        int i,j,n,a[30][30],k,l,pom;
        scanf ("%d",&n);
        for ( i = 0; i < n; i++ )
                for ( j = 0; j < n; j++ )
                        scanf ("%d",&a[i][j]);
        scanf ("%d%d",&k,&l);
        for ( i = 0; i < n; i++ )
        {
                pom = a[k-1][i];
                a[k-1][i] = a[l-1][i];
                a[l-1][i] = pom;
        }
        for ( i = 0; i < n; i++ )
        {
                for ( j = 0; j < n; j++ )
                        printf ("%d",a[i][j]);
                printf ("\n");
        }
}
```

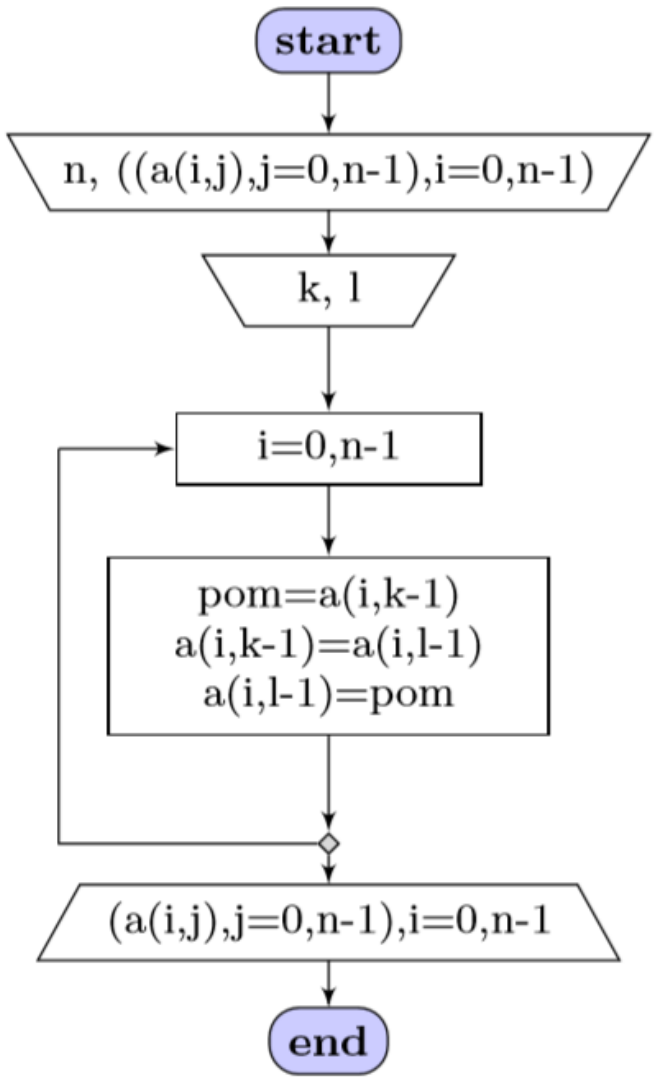
Ulaz

```
4
1  2  3  4
5  6  7  8
9  10 11 12
13 14 15 16
2 4
```

Izlaz

```
1  2  3  4
13 14 15 16
9  10 11 12
5  6  7  8
```

Zadatak 3 – Rešenje b)




```c
#include <stdio.h>
void main()
{
        int i,j,n,a[30][30],k,l,pom;
        scanf ("%d",&n);
        for ( i = 0; i < n; i++ )
                for ( j = 0; j < n; j++ )
                        scanf ("%d",&a[i][j]);
        scanf ("%d%d",&k,&l);
        for ( i = 0; i < n; i++ )
        {
                pom = a[i][k-1];
                a[i][k-1] = a[i][l-1];
                a[i][l-1] = pom;
        }
        for ( i = 0; i < n; i++ )
        {
                for ( j = 0; j < n; j++ )
                        printf ("%d ",a[i][j]);
                printf ("\n");
        }
}
```

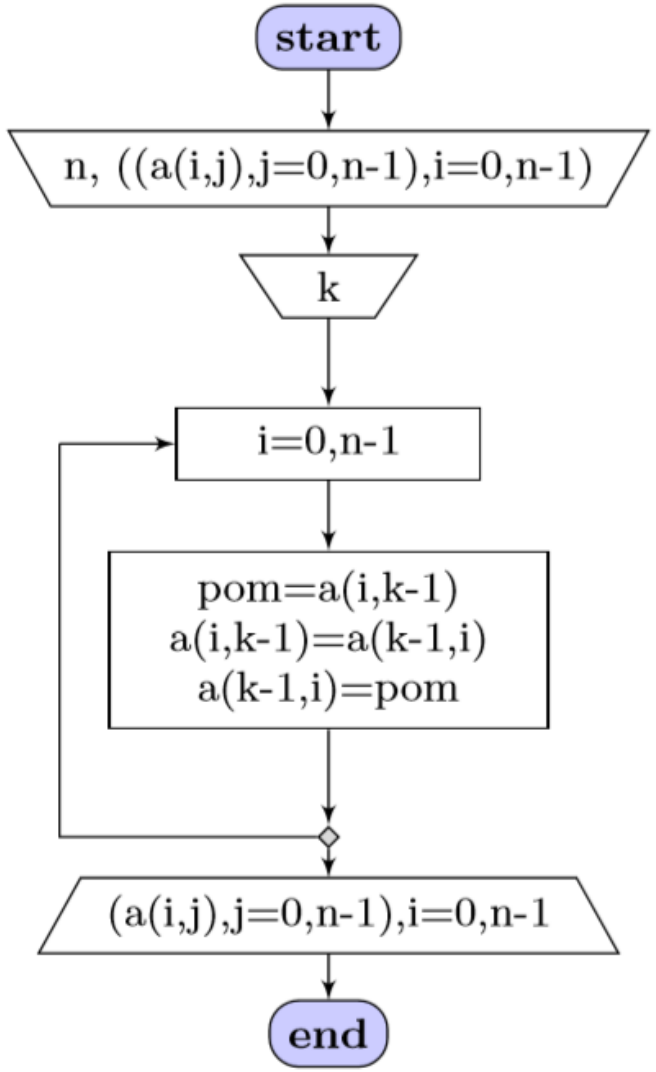
Ulaz

```
4
1  2  3  4
5  6  7  8
9  10 11 12
13 14 15 16
2 4
```

Izlaz

```
1  4  3  2
5  8  7  6
9  12 11 10
13 16 15 14
```

Zadatak 3 – Rešenje c)




```c
#include <stdio.h>
void main()
{
        int i,j,n,a[30][30],k,pom;
        scanf ("%d",&n);
        for ( i = 0; i < n; i++ )
                for ( j = 0; j < n; j++ )
                        scanf ("%d",&a[i][j]);
        scanf ("%d",&k);
        for ( i = 0; i < n; i++ )
        {
                pom = a[i][k-1];
                a[i][k-1] = a[k-1][i];
                a[k-1][i] = pom;
        }
        for ( i = 0; i < n; i++ )
        {
                for ( j = 0; j < n; j++ )
                        printf ("%d ",a[i][j]);
                printf ("\n");
        }
}
```

Ulaz

```
4
1  2  3  4
5  6  7  8
9  10 11 12
13 14 15 16
1
```

Izlaz

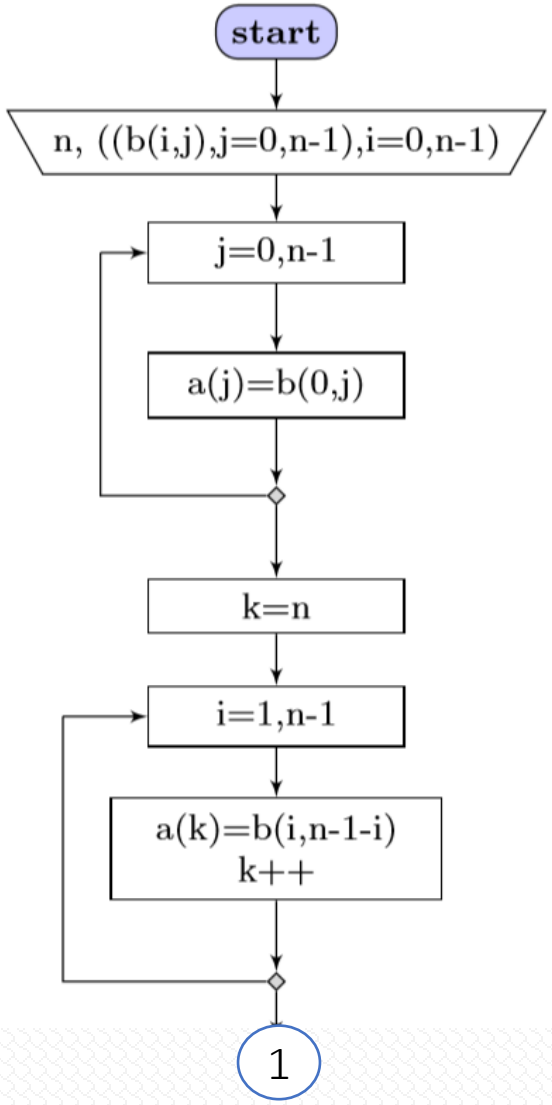
```
1 5  9  13
2 6  7  8
3 10 11 12
4 14 15 16
```

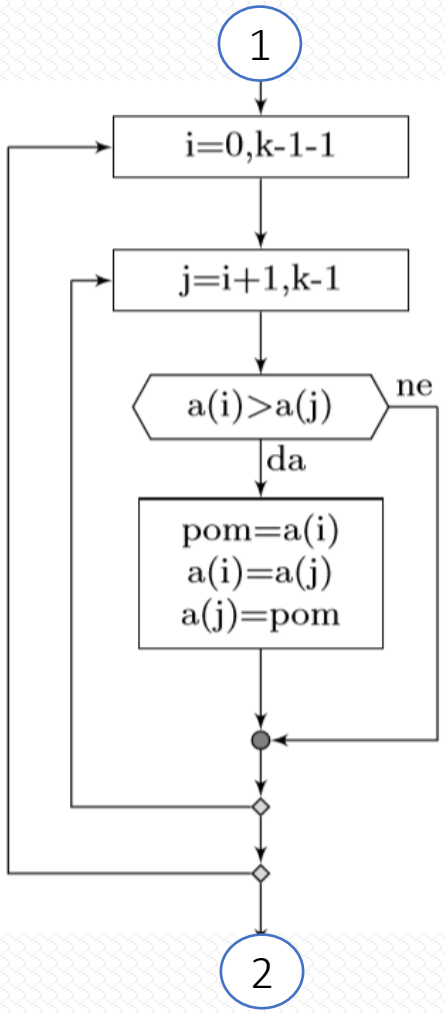
Zadatak 4

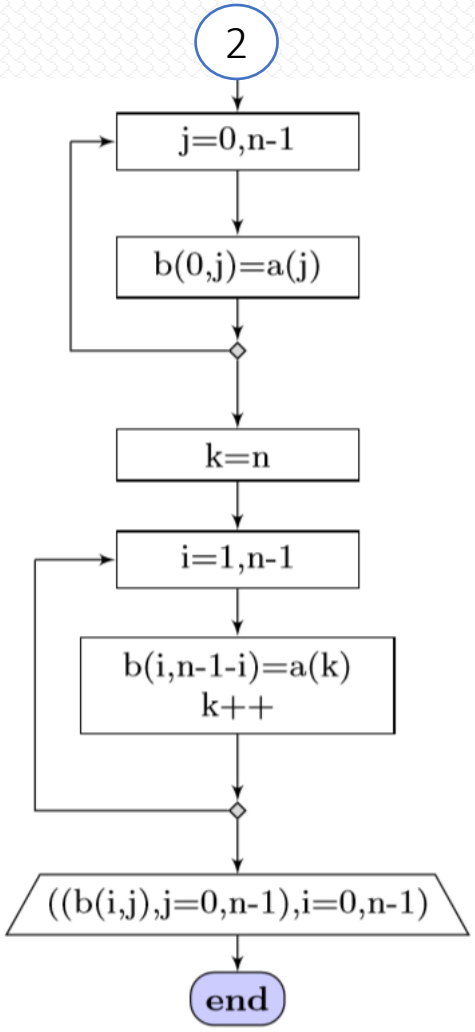
Nacrtati strukturni dijagram toka algoritma i na programskom jeziku C napisati strukturni program koji vrši sortiranje elemenata dela kvadratne matrice B_{NxN}, označenog na slici, u neopadajući redosled. Dimenziju matrice i vrednosti elemenata matrice zadaje korisnik. Prikazati matricu nakon transformacije.

$$B = \begin{bmatrix} 5 & 1 & 7 & 3 \\ 1 & 8 & 2 & 6 \\ 2 & 9 & 4 & 5 \\ 6 & 0 & 1 & 10 \end{bmatrix} \rightarrow B = \begin{bmatrix} 1 & 2 & 3 & 5 \\ 1 & 8 & 6 & 6 \\ 2 & 7 & 4 & 5 \\ 9 & 0 & 1 & 10 \end{bmatrix}$$

Zadatak 4 – Rešenje 1/1







Zadatak 4 – Rešenje 1/2

```
#include "stdio.h"
int main()
{
        int i,j,pom,a[30],b[15][15],n,k;
        scanf ("%d", &n);
        for (i = 0; i<n; i++)
        for (j = 0; j<n; j++)
                        scanf ("%d", &b[i][j]);
        // prvu vrstu i sporednu dijagonalu u pomocni niz

        for (j = 0; j<n; j++)
                a[j]=b[0][j];
        k=n;
        for (i = 1; i<n; i++)
        {
                a[k]=b[i][n-1-i];
                k++;
        }
        // sortiranje pomocnog niza
        for (i = 0; i<k-1; i++)
                for (j = i+1; j<k; j++)
                        if (a[i]>a[j])
                        {
                                pom=a[i];
                                a[i]=a[j];
                                a[j]=pom;
                        }
        //pomocni niz u prvu vrstu i sporednu dijagonalu
        for (j = 0; j<n; j++)
                b[0][j]=a[j];
        k=n;
        for (i = 1; i<n; i++)
        {
                b[i][n-1-i]=a[k];
                k++;
        }
        for (i = 0; i<n; i++)
        {
                for (j = 0; j<n; j++)
                        printf ("%d ", b[i][j]);
                printf ("\n");
        }
}
```

Ulaz

```
4
5 3 2 1
3 3 1 9
2 3 1 4
7 8 9 8
```

⇒

Izlaz

```
1 1 2 3
3 3 3 9
2 5 1 4
7 8 9 8
```

PITANJA

Forum na sajtu predmeta
cs.elfak.ni.ac.rs/nastava