

7-1. naloga: rešite podani sistem enačb z Matlab-ovimi funkcijami

$$2x_1 + 7x_2 + 5x_3 = -12$$

$$4x_1 + 6x_2 - x_3 = -11$$

$$9x_1 + 3x_2 - 3x_3 = 6$$

- podani sistem enačb rešite z uporabo:
 - A) operatorja “\”
 - B) funkcije *linsolve*
 - C) funkcije *qr*
 - D) funkcije *lu*
 - E) funkcije *rref*
 - F) funkcije *cgs*

The image shows the MATLAB environment with two windows: the Editor and the Command Window.

Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\7_1_dol_sis_en_Matlab.m

```

1  % resevanje določenega sistema enačb
2  -  clc; clear all;
3  -  Nn=3;
4  -  A=[ 2  7  5
5      4  6 -1
6      9  3 -3 ]
7  -  b=[-12
8      -11
9      6]
10 -  rA=rank(A);
11 -  Ab=[A,b];
12 -  rAb=rank(Ab);
13 -  [n,m]=size(Ab);
14 -  if rA ~= rAb
15 -     disp('Sistem enačb ni konsistenten. ');
16 -     return;
17 -  end
18 -  % st. neznanek=st. enačb
19 -  if (Nn-rA) ~= 0
20 -     if (Nn-rA) > 0
21 -         disp('Stevilo neznanek je več kot enačb - nedoločen s.e. ');
22 -         return;
23 -     else
24 -         disp('Stevilo neznanek je manj kot enačb - predoločen s.e. ');
25 -         return;
26 -     end
27 -  end

```

Command Window

```

A =
     2     7     5
     4     6    -1
     9     3    -3

b =
    -12
    -11
     6

=====
#### A) Gaussova metoda z delnim pivotiranjem
Kontrola resitve
Ost(1) = 0.00000000000000018
Ost(2) = 0.00000000000000053
Ost(3) = 0.00000000000000000
Resitve sistema enačb z operatorjem \
x(1) = +2.0000
x(2) = -3.0000
x(3) = +1.0000
|

```

Start Paused: Press any key

7-1-A

The image shows the MATLAB environment with a script editor and a command window. The script editor contains the following code:

```

28 % det(A)~=0
29 - dA = det(A);
30 - if dA == 0
31 -     disp('Matrika A je singularna. ');
32 -     return;
33 - end
34 - disp('#####')
35 - disp('#### A) Gaussova metoda z delnim pivotiranjem');
36 - x=A\b;
37 % Kontrola resitve
38 - Ost=A*x-b;
39 - fprintf(1,'Kontrola resitve \n');
40 - for i=1:1:rA
41 -     fprintf('Ost(%i)= %16.16f \n',i,Ost(i));
42 - end
43 % Ispis resitve
44 - fprintf(1,'Resitve sistema enacb z operatorjem \\ \n');
45 - for i=1:1:rA
46 -     fprintf(1,'x(%i)= %+6.4f \r',i,x(i));
47 - end
48 - pause

```

The command window shows the following output:

```

A =
     2     7     5
     4     6    -1
     9     3    -3

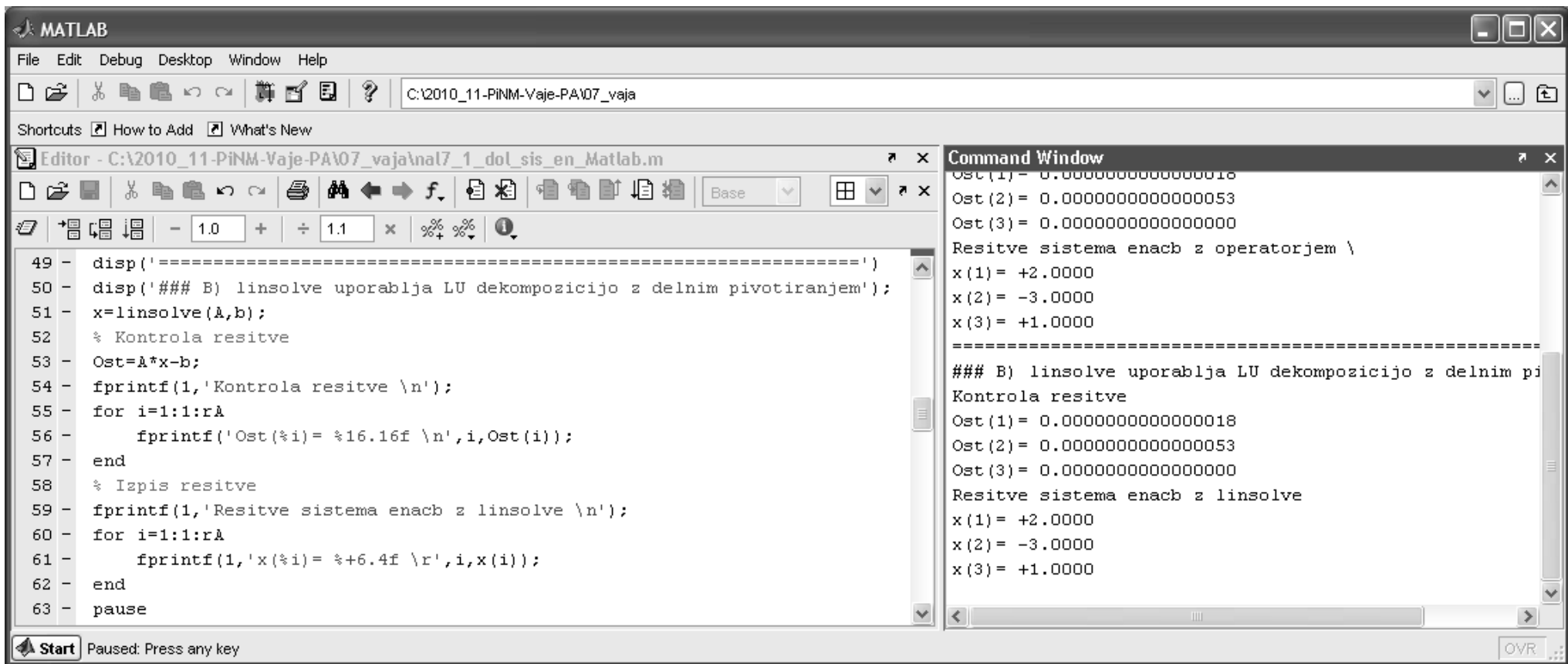
b =
    -12
    -11
     6

#####
#### A) Gaussova metoda z delnim pivotiranjem
Kontrola resitve
Ost(1)= 0.00000000000000018
Ost(2)= 0.00000000000000053
Ost(3)= 0.00000000000000000
Resitve sistema enacb z operatorjem \
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000

```

The status bar at the bottom indicates "Start Paused: Press any key" and "OVR".

7-1-B



The image shows the MATLAB software interface. The main window is titled "MATLAB" and contains a menu bar (File, Edit, Debug, Desktop, Window, Help) and a toolbar. Below the toolbar is a "Shortcuts" section with links for "How to Add" and "What's New". The central area is the "Editor" window, which displays a script file named "C:\2010_11-PiNM-Vaje-PA\07_vaja\al7_1_dol_sis_en_Matlab.m". The script contains the following code:

```
49 - disp('=====')
50 - disp('### B) linsolve uporablja LU dekompozicijo z delnim pivotiranjem');
51 - x=linsolve(A,b);
52 - % Kontrola resitve
53 - Ost=A*x-b;
54 - fprintf(1,'Kontrola resitve \n');
55 - for i=1:1:rA
56 -     fprintf('Ost(%i)= %16.16f \n',i,Ost(i));
57 - end
58 - % Ispis resitve
59 - fprintf(1,'Resitve sistema enacb z linsolve \n');
60 - for i=1:1:rA
61 -     fprintf(1,'x(%i)= %+6.4f \r',i,x(i));
62 - end
63 - pause
```

The "Command Window" on the right side of the interface shows the output of the script:

```
Ost(1)= 0.000000000000000018
Ost(2)= 0.000000000000000053
Ost(3)= 0.000000000000000000
Resitve sistema enacb z operatorjem \
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
=====
### B) linsolve uporablja LU dekompozicijo z delnim pi
Kontrola resitve
Ost(1)= 0.000000000000000018
Ost(2)= 0.000000000000000053
Ost(3)= 0.000000000000000000
Resitve sistema enacb z linsolve
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
```

At the bottom left of the MATLAB window, there is a "Start" button and a status bar that reads "Paused: Press any key". At the bottom right, there is an "OVR" button.

7-1-C

The image shows the MATLAB environment with a script editor and a command window. The script editor contains the following code:

```

64 - disp('=====')
65 - disp('#### C) QR metoda');
66 - % A=Q*R
67 - % Q*Q'=I
68 - % Q*R*x=b      Q'*Q*R*x=R*x=Q'*b
69 - [Q,R]=qr(A);
70 - y=Q'*b;
71 - x=R\y;
72 - % Kontrola resitve
73 - Ost=A*x-b;
74 - fprintf(1,'Kontrola resitve \n');
75 - for i=1:1:rA
76 -     fprintf('Ost(%i)= %16.16f \n',i,Ost(i));
77 - end
78 - % Ispis resitve
79 - fprintf(1,'Resitve sistema enacb s QR metodo\n');
80 - for i=1:1:rA
81 -     fprintf(1,'x(%i)= %+6.4f \r',i,x(i));
82 - end
83 - pause

```

The command window shows the output of the script:

```

x(3)= +1.0000
=====
### B) linsolve uporablja LU dekompozicijo z delnim pi
Kontrola resitve
Ost(1)= 0.00000000000000018
Ost(2)= 0.00000000000000053
Ost(3)= 0.00000000000000000
Resitve sistema enacb z linsolve
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
=====
#### C) QR metoda
Kontrola resitve
Ost(1)= 0.00000000000000000
Ost(2)= -0.00000000000000053
Ost(3)= 0.00000000000000000
Resitve sistema enacb s QR metodo
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000

```

The status bar at the bottom indicates "Paused: Press any key" and "OVR".

7-1-D

The image shows the MATLAB environment with a script editor and a command window. The script editor contains the following code:

```

84 - disp('=====')
85 - disp('#### D) LU metoda');
86 - % P*A*x=P*L*U*x=P*L*y=P*b
87 - [L,U,P]=lu(A);
88 - % L in U sta ze permutirana zaradi delnega pivotiranja
89 - Pb=P*b;
90 - y=L\Pb;
91 - x=U\y;
92 - % Kontrola resitve
93 - Ost=A*x-b;
94 - fprintf(1,'Kontrola resitve \n');
95 - for i=1:1:rA
96 -     fprintf('Ost(%i)= %16.16f \n',i,Ost(i));
97 - end
98 - % Ispis resitve
99 - fprintf(1,'Resitve sistema enacb z LU metodo\n');
100 - for i=1:1:rA
101 -     fprintf(1,'x(%i)= %+6.4f \r',i,x(i));
102 - end
103 - pause

```

The command window shows the output of the script:

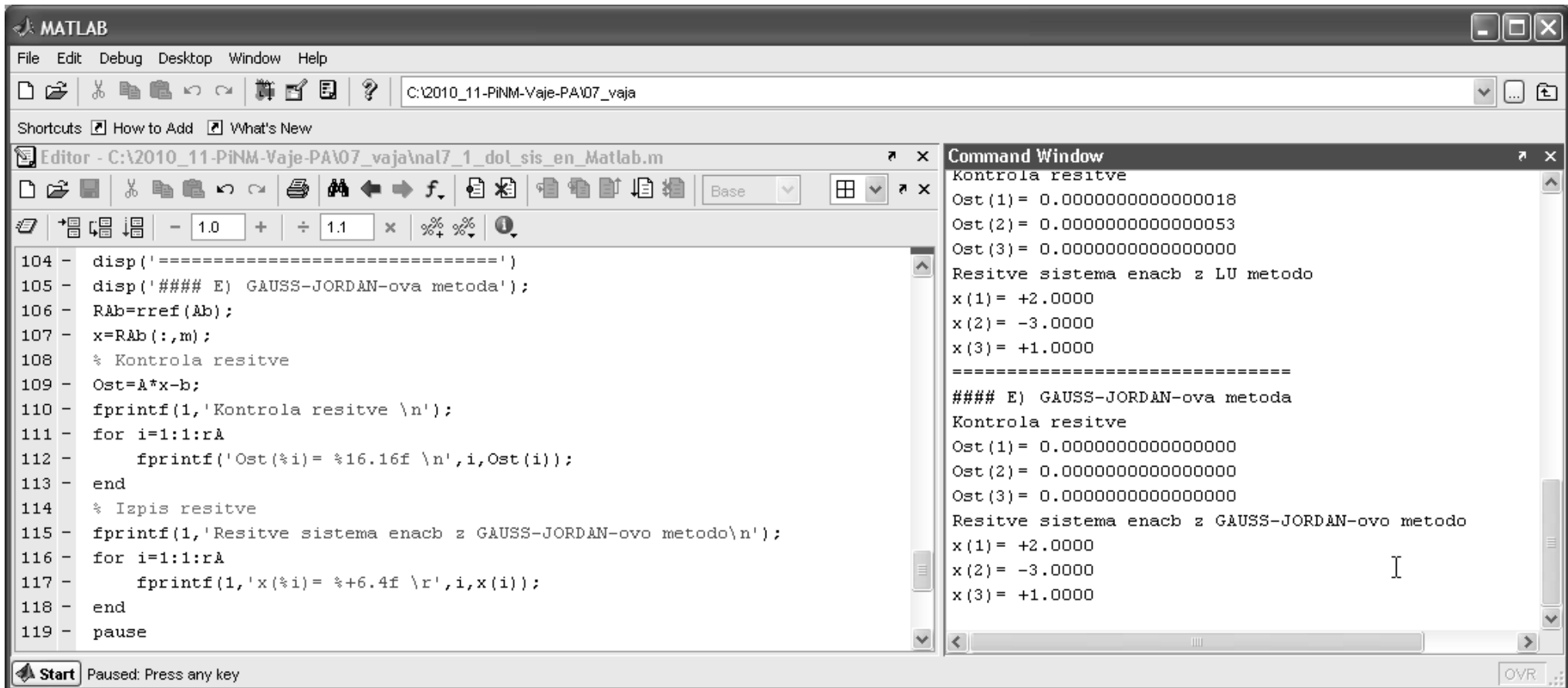
```

x(3)= +1.0000
=====
#### C) QR metoda
Kontrola resitve
Ost(1)= 0.0000000000000000
Ost(2)= -0.0000000000000053
Ost(3)= 0.0000000000000000
Resitve sistema enacb s QR metodo
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
=====
#### D) LU metoda
Kontrola resitve
Ost(1)= 0.0000000000000018
Ost(2)= 0.0000000000000053
Ost(3)= 0.0000000000000000
Resitve sistema enacb z LU metodo
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000

```

The status bar at the bottom indicates "Paused: Press any key" and "OVR".

7-1-E



The image shows the MATLAB environment with two windows: the Editor and the Command Window.

Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\al7_1_dol_sis_en_Matlab.m

```
104 - disp('=====')
105 - disp('### E) GAUSS-JORDAN-ova metoda');
106 - RAb=rref(Ab);
107 - x=RAb(:,m);
108 - % Kontrola resitve
109 - Ost=A*x-b;
110 - fprintf(1,'Kontrola resitve \n');
111 - for i=1:1:rA
112 -     fprintf('Ost(%i)= %16.16f \n',i,Ost(i));
113 - end
114 - % Ispis resitve
115 - fprintf(1,'Resitve sistema enach z GAUSS-JORDAN-ovo metodo\n');
116 - for i=1:1:rA
117 -     fprintf(1,'x(%i)= %+6.4f \r',i,x(i));
118 - end
119 - pause
```

Command Window

```
Kontrola resitve
Ost(1)= 0.00000000000000018
Ost(2)= 0.00000000000000053
Ost(3)= 0.00000000000000000
Resitve sistema enach z LU metodo
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
=====
### E) GAUSS-JORDAN-ova metoda
Kontrola resitve
Ost(1)= 0.00000000000000000
Ost(2)= 0.00000000000000000
Ost(3)= 0.00000000000000000
Resitve sistema enach z GAUSS-JORDAN-ovo metodo
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
```

Start Paused: Press any key

7-1-F

The image shows the MATLAB software interface. The main window is titled "MATLAB" and contains a menu bar (File, Edit, Debug, Desktop, Window, Help) and a toolbar. The current file is "C:\2010_11-PiNM-Vaje-PA\07_vaja". Below the menu bar, there are shortcuts for "How to Add" and "What's New". The main workspace is divided into two panes: "Editor" and "Command Window".

The "Editor" pane shows the following MATLAB code:

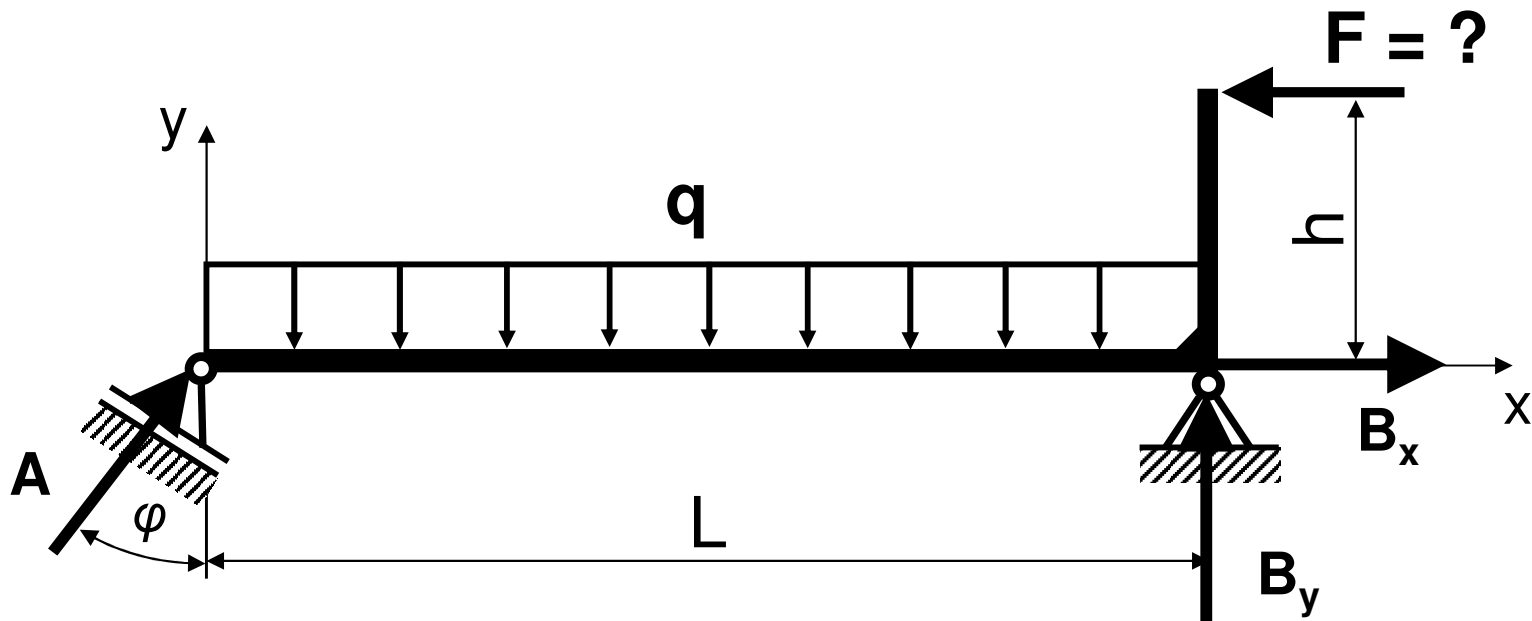
```
120 - disp('=====')
121 - disp('#### F) iterativna metoda konjugiranih gradientov');
122 - x=cgs(A,b);
123 - % Kontrola resitve
124 - Ost=A*x-b;
125 - fprintf(1,'Kontrola resitve \n');
126 - for i=1:1:rA
127 -     fprintf('Ost(%i)= %16.16f \n',i,Ost(i));
128 - end
129 - % Ispis resitve
130 - fprintf(1,'Resitve sistema enacb z metodo konjugiranih gradientov\n');
131 - for i=1:1:rA
132 -     fprintf(1,'x(%i)= %+6.4f \r',i,x(i));
133 - end
```

The "Command Window" pane shows the output of the code execution:

```
Ost(3) = 0.00000000000000000000
Resitve sistema enacb z GAUSS-JORDAN-ovo metodo
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
=====
#### F) iterativna metoda konjugiranih gradientov
cgs converged at iteration 3 to a solution with relative error
Kontrola resitve
Ost(1)= 0.000000000000000002203
Ost(2)= 0.00000000000000001634
Ost(3)= 0.00000000000000002007
Resitve sistema enacb z metodo konjugiranih gradientov
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
>>
```

The "Command Window" also shows a "Start" button and an "OVR" indicator.

7-2. naloga: izračunajte odvisnost reakcij v podporah nosilca od poljubne sile F



$$"R_x": A \sin(\varphi) + B_x - F = 0$$

$$"R_y": A \cos(\varphi) + B_y - qL = 0$$

$$"M_z": B_y L + Fh - qL \frac{L}{2} = 0$$

$$L = 4.0\text{m}$$

$$h = 1.5\text{m}$$

$$\varphi = 30^\circ$$

$$q = 3 \text{ kN/m}$$

$$F = ? \text{ kN}$$

7-2. naloga: izračunajte odvisnost reakcij v podporah nosilca od poljubne sile F

- preurejen sistem enačb

$$A \sin(\varphi) + B_x - F = 0$$

$$A \cos(\varphi) + B_y = qL$$

$$B_y L + Fh = q \frac{L^2}{2}$$

- matrični zapis sistema enačb

$$\begin{bmatrix} \sin(\varphi) & 1 & 0 & -1 \\ \cos(\varphi) & 0 & 1 & 0 \\ 0 & 0 & L & h \end{bmatrix} \begin{Bmatrix} A \\ B_x \\ B_y \\ F \end{Bmatrix} = \begin{Bmatrix} 0 \\ qL \\ qL^2/2 \end{Bmatrix}$$

$$[M]\{R\} = \{D\}$$

7-2. naloga: izračunajte odvisnost reakcij v podporah nosilca od poljubne sile F

- matrika [pM] je z vektorjem {D} razširjena matrika [M]

$$[pM] = \begin{bmatrix} \sin(\varphi) & 1 & 0 & -1 & 0 \\ \cos(\varphi) & 0 & 1 & 0 & qL \\ 0 & 0 & L & h & qL^2/2 \end{bmatrix}$$

- matrika [RM] je preurejena matrika [pM]

$$[RM] = \begin{bmatrix} 1 & 0 & 0 & -h/(L \cos(\varphi)) & qL/(2 \cos(\varphi)) \\ 0 & 1 & 0 & (h \tan(\varphi) - L)/L & -qL \tan(\varphi)/2 \\ 0 & 0 & 1 & h/L & qL/2 \end{bmatrix}$$

7-2. naloga: izračunajte odvisnost reakcij v podporah nosilca od poljubne sile F

- rezultat reševanja

$$\begin{Bmatrix} A \\ B_x \\ B_y \end{Bmatrix} = \begin{Bmatrix} qL/(2\cos(\varphi)) \\ -qL\tan(\varphi)/2 \\ qL/2 \end{Bmatrix} - \begin{Bmatrix} -h/(L\cos(\varphi)) \\ (h\tan(\varphi) - L)/L \\ h/L \end{Bmatrix} F$$

- podani nedoločeni sistem enačb rešujte z uporabo:
 - A) funkcije *rref*
 - B) operatorja “\” in funkcije *null*

7-2-A

The image shows a MATLAB environment with a script editor and a command window. The script in the editor defines a system of equations and checks for its solvability. The command window displays the output of the script, indicating that the system is not solvable due to an infinite number of unknowns.

Script Editor (C:\2010_11-PiNM-Vaje-PA\07_vaja\7_2A.m):

```

1  % nedoločen sistem enačb
2  - clc;
3  - clear all;
4  - L = 4; % [m]
5  - h = 1.5; % [m]
6  - fi = 30; % [°]
7  - q = 3; % [kN/m]
8  % št. neznank
9  - Nn = 4;
10 %
11 - M=[sind(fi),1,0,-1
12     cosd(fi),0,1,0
13     0,0,L,h ];
14 - D = [ 0
15         q*L
16         q*L*L/2 ];
17 - pM=[M,D];
18 % rang(M)==rang(pM)
19 - rM = rank(M);
20 - rpM = rank([pM]);
21 - if rM ~= rpM
22     disp('Enačbe v sistemu enačb niso med seboj linearno neodvisne.');
```

Command Window:

```

Ne obstaja ena sama rešitev sistema enačb.
Stevilo neznank je več kot enačb - nedoločen s.e.
Uporabljena je Gauss-Jordanova metoda
RM =
    1.0000    0    0   -0.4330    6.9282
         0    1.0000    0   -0.7835   -3.4641
         0    0    1.0000    0.3750    6.0000

P =
     1     2     3
Podaj silo F [kN]: 6
  A = 9.53 kN
  Bx = 1.24 kN
  By = 3.75 kN
>>

```

7-2-A

The image shows a MATLAB environment with two windows: the Editor and the Command Window.

Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\nal7_2A.m

```

25 % Ce je N prazna matrika, potem obstaja natanko ena resitev
26 - NM=null(M);
27 - if NM ~= NaN
28 -     disp('Ne obstaja ena sama resitev sistema enacb. ');
29 - end
30 % st. neznank=st. enacb
31 - if (Nn-rM) ~= 0
32 -     if (Nn-rM) > 0
33 -         disp('Stevilo neznank je vec kot enacb - nedolocen s.e. ');
34 -     else
35 -         disp('Stevilo neznank je manj kot enacb - predolocen s.e. ');
36 -     end
37 - end
38 - disp('Uporabljena je Gauss-Jordanova metoda');
39 - [RM,P]=rref(pM)
40 - F=input('Podaj silo F [kN]: ');
41 - R=RM(:,5)-RM(:,4)*F;
42 - fprintf(' A = %0.2f kN \n',R(1))
43 - fprintf(' Bx = %0.2f kN \n',R(2))
44 - fprintf(' By = %0.2f kN \n',R(3))

```

Command Window

```

Ne obstaja ena sama resitev sistema enacb.
Stevilo neznank je vec kot enacb - nedolocen s.e.
Uporabljena je Gauss-Jordanova metoda
RM =
    1.0000    0    0   -0.4330    6.9282
         0    1.0000    0   -0.7835   -3.4641
         0    0    1.0000    0.3750    6.0000
P =
     1     2     3
Podaj silo F [kN]: 6
 A = 9.53 kN
 Bx = 1.24 kN
 By = 3.75 kN
>>

```

7-2-B

The image shows a MATLAB environment with a script editor and a command window. The script in the editor defines a system of equations and checks for its solvability. The command window shows the execution results, indicating that the system is not solvable due to an infinite number of unknowns.

Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\7_2B.m*

```

1  % nedoločen sistem enacb
2  -  clc;
3  -  clear all;
4  -  L = 4; % [m]
5  -  h = 1.5; % [m]
6  -  fi = 30; % [°]
7  -  q = 3; % [kN/m]
8  % št. neznank
9  -  Nn = 4;
10 %
11 -  M=[sind(fi),1,0,-1
12     cosd(fi),0,1,0
13     0,0,L,h ];
14 -  D = [ 0
15     q*L
16     q*L*L/2 ];
17 -  pM=[M,D];
18 % rang(M)==rang(pM)
19 -  rM = rank(M);
20 -  rpM = rank([pM]);
21 -  if rM ~= rpM
22     disp('Enache v sistemu enacb niso med seboj linearno neodvisne.');
```

Command Window

```

Ne obstaja ena sama rešitev sistema enacb.
Stevilo neznank je vec kot enacb - nedolocen s.e.
Podaj silo F [kN]: 6
  A = 9.53 kN
  Bx = 1.24 kN
  By = 3.75 kN
>>
```

7-2-B

The image shows a MATLAB environment with two windows: the Editor and the Command Window.

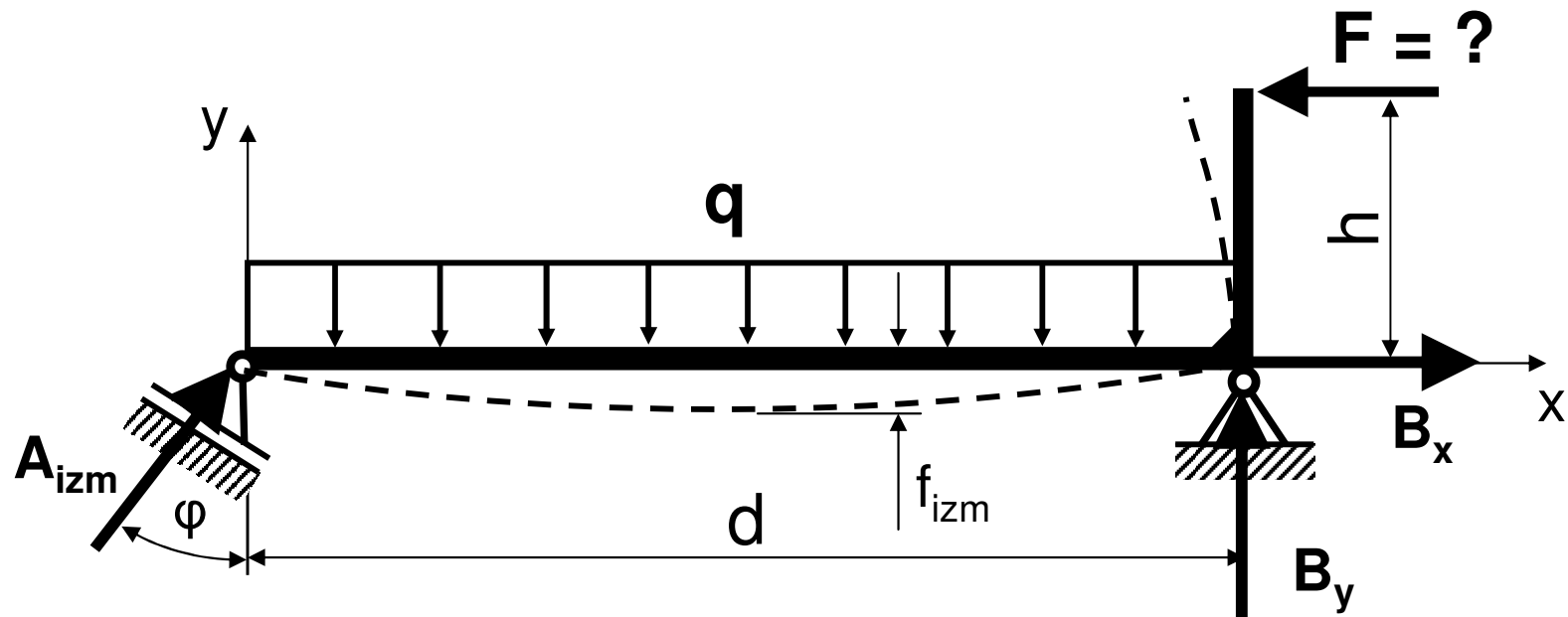
Editor Window: The script contains the following code:

```
27 - if NM ~= NaN
28 -     disp('Ne obstaja ena sama rešitev sistema enacb. ');
29 - end
30 - % st. neznank=st. enacb
31 - if (Nn-rM) ~= 0
32 -     if (Nn-rM) > 0
33 -         disp('Stevilo neznank je vec kot enacb - nedolocen s.e. ');
34 -     else
35 -         disp('Stevilo neznank je manj kot enacb - predolocen s.e. ');
36 -     end
37 - end
38 - % [Mk] je kopija [M]
39 - Mk=M;
40 - % izberemo F=0
41 - Mk(:,4)=[];
42 - dMk = det(Mk);
43 - if dMk == 0
44 -     disp('Matrika M je singularna. ');
45 -     return;
46 - end
47 - Rk=Mk\D;
48 - Rk(4)=0;
49 - N=null(M);
50 - F=input('Podaj silo F [kN]: ');
51 - R=Rk+N/N(4)*F;
52 - fprintf(' A = %0.2f kN \n',R(1))
53 - fprintf(' Bx = %0.2f kN \n',R(2))
54 - fprintf(' By = %0.2f kN \n',R(3))
55
```

Command Window: The output of the script is as follows:

```
Ne obstaja ena sama rešitev sistema enacb.
Stevilo neznank je vec kot enacb - nedolocen s.e.
Podaj silo F [kN]: 6
 A = 9.53 kN
 Bx = 1.24 kN
 By = 3.75 kN
>>
```


7-3. naloga: izračunajte pri kolikšni sili F so bili izmerjeni podani podatki



$$"R_x": A_{izm} \sin(\varphi) + B_x - F = 0$$

$$"R_y": A_{izm} \cos(\varphi) + B_y - qL = 0$$

$$"M_z": B_y L + Fh - qL \frac{L}{2} = 0$$

$$f_{izm} = \left(\frac{5qL^4}{384} + \frac{3FhL^2}{8} \right) / (EI)$$

$$E = 2.E5 \text{ MPa}$$

$$I = 3.E7 \text{ mm}^4$$

$$L = 4.0 \text{ m}$$

$$h = 1.5 \text{ m}$$

$$\varphi = 30^\circ$$

$$q = 3 \text{ kN/m}$$

$$A_{izm} = 9.5 \text{ kN}$$

$$f_{izm} = 9 \text{ mm}$$

7-3. naloga: izračunajte pri kolikšni sili F so bili izmerjeni podani podatki

- preurejen sistem enačb

$$B_x - F = -A_{izm} \sin(\varphi)$$

$$B_y = -A_{izm} \cos(\varphi) + qL$$

$$B_y L + Fh = q \frac{L^2}{2}$$

$$\frac{3hL^2}{8EI} = f_{izm} - \frac{5qL^4}{384EI}$$

- matrični zapis sistema enačb

$$\begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 0 \\ 0 & L & h \\ 0 & 0 & (3hL^2)/(8EI) \end{bmatrix} \begin{Bmatrix} B_x \\ B_y \\ F \end{Bmatrix} = \begin{Bmatrix} -A_{izm} \sin(\varphi) \\ -A_{izm} \cos(\varphi) + qL \\ qL^2/2 \\ f_{izm} - (5qL^4)/(384EI) \end{Bmatrix}$$

$$[M]\{R\} = \{D\}$$

7-3. naloga: izračunajte pri kolikšni sili F so bili izmerjeni podani podatki

The screenshot displays the MATLAB environment with the following components:

- Workspace:** Lists variables such as Aizm (9.5), C, D, E, I, L, M, R1, R2, d, fi, fizm, h, kon..., pM, q, rM, and rpM.
- Editor:** Contains a MATLAB script for structural analysis. The script defines parameters like E, I, L, h, fi, q, and fizm, constructs a matrix M, and calculates the rank of M and pM. It also includes comments in Slovenian: "neznanke so tri, enacbe so štiri" and "rM je različen od rpM".
- Command Window:** Shows the execution results, including the force values: Bx = 1.19 kN, By = 3.77 kN, and F = 5.94 kN. It also displays the results of the inverse matrix calculation and the remaining equations.

```

1 % 
2 - clc;
3 - clear all;
4 - format long
5 - E=2.e8; % [kN/m2]
6 - I=3.e-5; % [m4]
7 - L=4; % [m]
8 - h=1.5; % [m]
9 - fi=30; % [°]
10 - q=3; % [kN/m]
11 - Aizm=9.5; % [kN]
12 - fizm=0.009; % [m]
13 - M=[1,0, -1
14     0,1, 0
15     0,L, h
16     0 0 (3*h*L*L)/(8*E*I)];
17 - D = [ -Aizm*sind(fi)
18        -Aizm*cosd(fi)+q*L
19        q*L*L/2
20        fizm-(5*q*L^4)/(384*E*I)];
21 - pM=[M,D];
22 % neznanke so tri, enacbe so štiri
23 % rM je različen od rpM
24 - rM=rank(M);
25 - rpM=rank(pM);
  
```

```

### Uporaba operatorja \ ###
Bx = 1.19 kN
By = 3.77 kN
F = 5.94 kN
Ostane:
1.enacba: -0.0000000000 kN
2.enacba: -0.0000063024 kN
3.enacba: +0.0000015756 kNm
4.enacba: -0.0015756052 m

### R=inv(M`*M)*(M`*D) ###
Bx = 1.19 kN
By = 3.77 kN
F = 5.94 kN
Ostane:
1.enacba: +0.0000000000 kN
2.enacba: -0.0000063024 kN
3.enacba: +0.0000015756 kNm
4.enacba: -0.0015756052 m
>>
  
```

7-3. naloga: izračunajte pri kolikšni sili F so bili izmerjeni podani podatki

The screenshot displays the MATLAB environment with three main panels:

- Workspace:** Lists variables and their values:

Name	Value
Aizm	9.5
C	[1 0 -1; 0 17 6; -1 6 3.25]
D	[-4.75; 3.7728; 24; 0.0073]
E	200000000
I	0
L	4
M	<4x3 double>
R1	[1.1893; 3.7728; 5.9393]
R2	[1.1893; 3.7728; 5.9393]
d	[-4.75; 99.7728; 40.75]
fi	30
fizm	0.009
h	1.5
kon...	[-8.8818e-016; 0; 0; -0.0016]
kon...	[8.8818e-016; 0; 0; -0.0016]
pM	<4x4 double>
q	3
rM	3
rpM	4
- Editor:** Shows the MATLAB script for solving the problem:

```
26 %  
27 % 1. varianta  
28 %  
29 - R1=M\D;  
30 - disp('### Uporaba operatorja \ ###')  
31 - fprintf('Bx = %0.2f kN \n',R1(1))  
32 - fprintf('By = %0.2f kN \n',R1(2))  
33 - fprintf(' F = %0.2f kN \n',R1(3))  
34 - kontrola1=D-M*R1;  
35 - disp('Ostane:')  
36 - fprintf(' 1.enacba: %+0.10f kN \n',kontrola1(1))  
37 - fprintf(' 2.enacba: %+0.10f kN \n',kontrola1(2))  
38 - fprintf(' 3.enacba: %+0.10f kNm \n',kontrola1(3))  
39 - fprintf(' 4.enacba: %+0.10f m \n',kontrola1(4))  
40 %  
41 % 2. varianta  
42 %  
43 - C=M'*M;  
44 - d=M'*D;  
45 % inv(C) = C^(-1)  
46 - R2=inv(C)*d;
```
- Command Window:** Shows the output of the script:

```
### Uporaba operatorja \ ###  
Bx = 1.19 kN  
By = 3.77 kN  
 F = 5.94 kN  
Ostane:  
 1.enacba: -0.0000000000 kN  
 2.enacba: -0.0000063024 kN  
 3.enacba: +0.0000015756 kNm  
 4.enacba: -0.0015756052 m  
  
### R=inv(M'*M)*(M'*D) ###  
Bx = 1.19 kN  
By = 3.77 kN  
 F = 5.94 kN  
Ostane:  
 1.enacba: +0.0000000000 kN  
 2.enacba: -0.0000063024 kN  
 3.enacba: +0.0000015756 kNm  
 4.enacba: -0.0015756052 m  
>>
```

7-3. naloga: izračunajte pri kolikšni sili F so bili izmerjeni podani podatki

The image shows the MATLAB environment with a script file named `nal9_3.m` open in the Editor. The script calculates the force F based on measured data. The Command Window displays the output of the script, showing the calculated force $F = 5.94$ kN and control values for four gauges.

Workspace:

Name	Value
Aizm	9.5
C	[1 0 -1; 0 17 6; -1 6 3.25]
D	[-4.75; 3.7728; 24; 0.0073]
E	200000000
I	0
L	4
M	<4x3 double>
R1	[1.1893; 3.7728; 5.9393]
R2	[1.1893; 3.7728; 5.9393]
d	[-4.75; 99.7728; 40.75]
fi	30
fizm	0.009
h	1.5
kon...	[-8.8818e-016; 0; 0; -0.0016]
kon...	[8.8818e-016; 0; 0; -0.0016]
pM	<4x4 double>
q	3
rM	3
rpM	4

Editor - C:\2010_11-NM-RR-redni-vaje\9_vaja\nal9_3.m

```
36 - fprintf(' 1.enacba: %+0.10f kN \n',kontrola1(1))
37 - fprintf(' 2.enacba: %+0.10f kN \n',kontrola1(2))
38 - fprintf(' 3.enacba: %+0.10f kNm \n',kontrola1(3))
39 - fprintf(' 4.enacba: %+0.10f m \n',kontrola1(4))
40 *
41 * 2. varianta
42 *
43 - C=M'*M;
44 - d=M'*D;
45 * inv(C) = C^(-1)
46 - R2=inv(C)*d;
47 - fprintf('\n### R=inv(M'*M)*(M'*D) ###\n')
48 - fprintf('Bx = %0.2f kN \n',R2(1))
49 - fprintf('By = %0.2f kN \n',R2(2))
50 - fprintf(' F= %0.2f kN \n',R2(3))
51 - kontrola2=D-M*R2;
52 - disp('OstaneK:')
53 - fprintf(' 1.enacba: %+0.10f kN \n',kontrola2(1))
54 - fprintf(' 2.enacba: %+0.10f kN \n',kontrola2(2))
55 - fprintf(' 3.enacba: %+0.10f kNm \n',kontrola2(3))
56 - fprintf(' 4.enacba: %+0.10f m \n',kontrola2(4))
```

Command Window

```
### Uporaba operatorja \ ###
Bx = 1.19 kN
By = 3.77 kN
 F = 5.94 kN
OstaneK:
 1.enacba: -0.0000000000 kN
 2.enacba: -0.0000063024 kN
 3.enacba: +0.0000015756 kNm
 4.enacba: -0.0015756052 m

### R=inv(M'*M)*(M'*D) ###
Bx = 1.19 kN
By = 3.77 kN
 F = 5.94 kN
OstaneK:
 1.enacba: +0.0000000000 kN
 2.enacba: -0.0000063024 kN
 3.enacba: +0.0000015756 kNm
 4.enacba: -0.0015756052 m
>>
```