8-1. naloga: **rešite podani sistem enačb z Matlab-ovimi funkcijami**

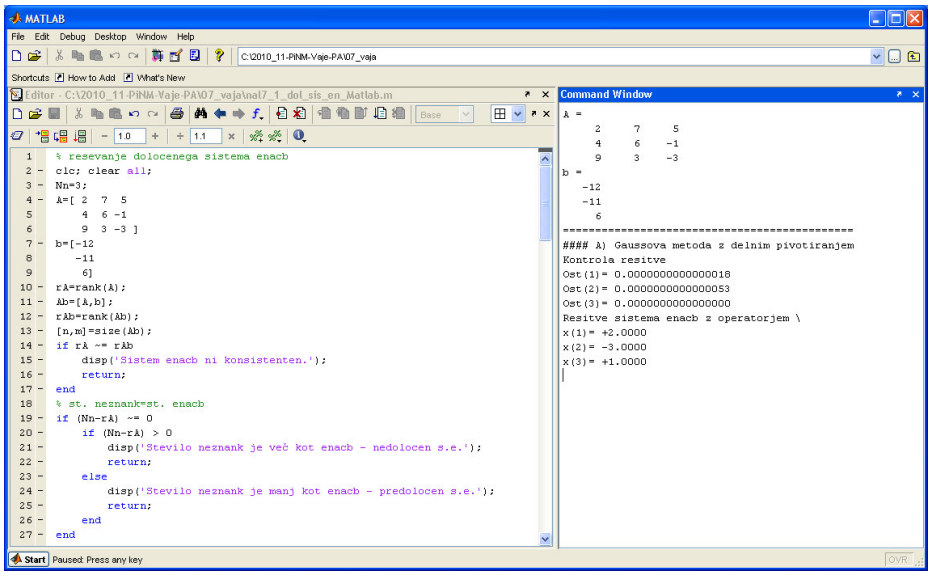
$$2x_1 + 7x_2 + 5x_3 = -12$$
$$4x_1 + 6x_2 - x_3 = -11$$
$$9x_1 + 3x_2 - 3x_3 = 6$$

• podani sistem enačb rešite z uporabo:

A) operatorja "\"
B) funkcije *linsolve*
C) funkcije *qr*
D) funkcije *lu*
E) funkcije *rref*
F) funkcije *cgs*

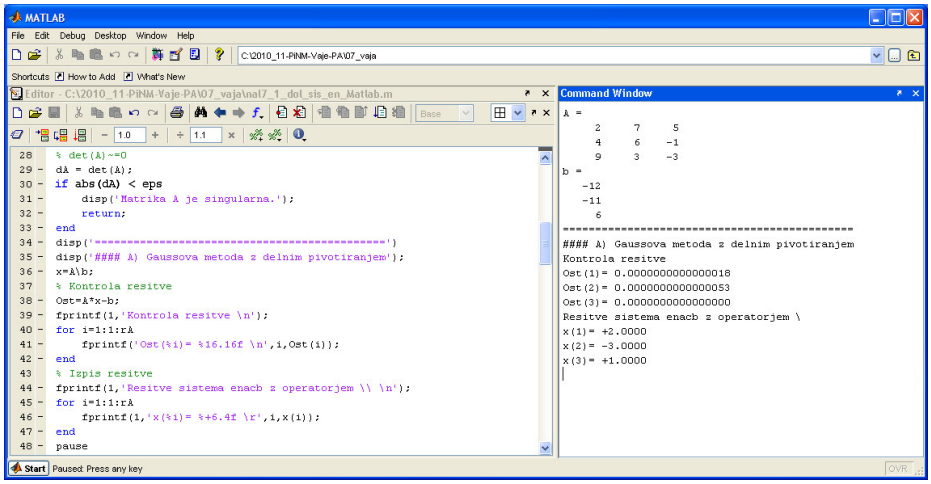
NM: V-VIII/1

8-1

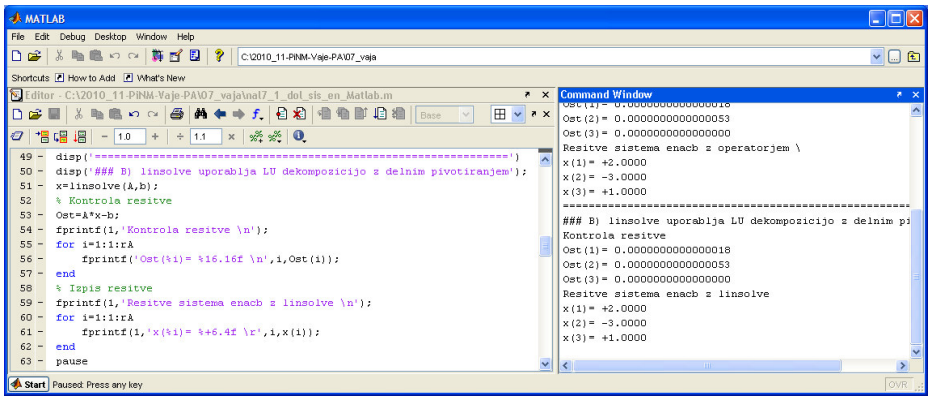


NM: V-VIII/2

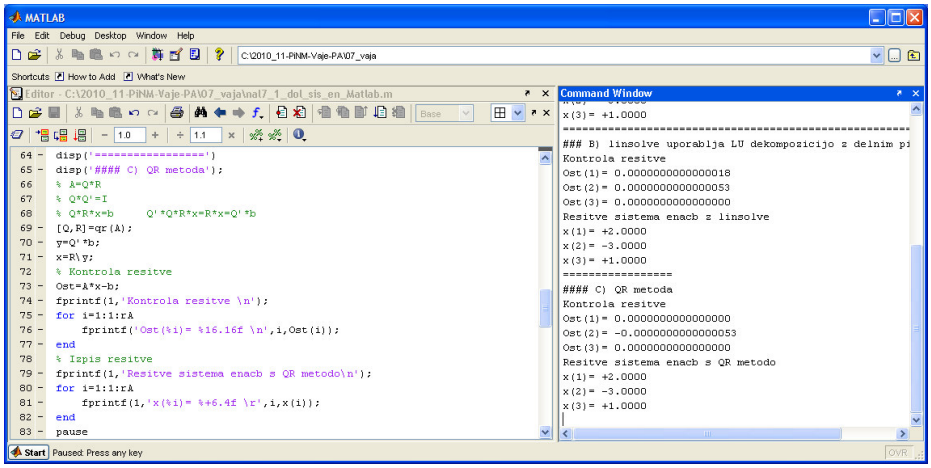
8-1-A


MATLAB
File Edit Debug Desktop Window Help
C:\2010_11-PiNM-Vaje-PA\07_vaja
Shortcuts How to Add What's New
Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\nal7_1_dol_sis_en_Matlab.m
28 % det(A)~=0
29 - dA = det(A);
30 - if abs(dA) < eps
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 % Izpis 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
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)= 0.0000000000000018
Ost(2)= 0.0000000000000053
Ost(3)= 0.0000000000000000
Resitve sistema enacb z operatorjem \
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
Start Paused: Press any key
OVR

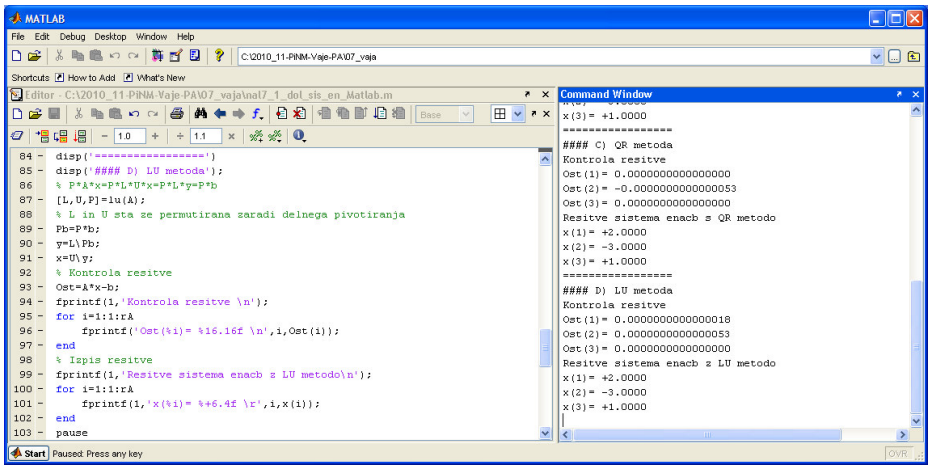
8-1-B


MATLAB
File Edit Debug Desktop Window Help
C:\2010_11-PiNM-Vaje-PA\07_vaja
Shortcuts How to Add What's New
Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\nal7_1_dol_sis_en_Matlab.m
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 % Izpis 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
Command Window
Ost(2)= 0.0000000000000053
Ost(3)= 0.0000000000000000
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)= 0.0000000000000018
Ost(2)= 0.0000000000000053
Ost(3)= 0.0000000000000000
Resitve sistema enacb z linsolve
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
Start Paused: Press any key
OVR

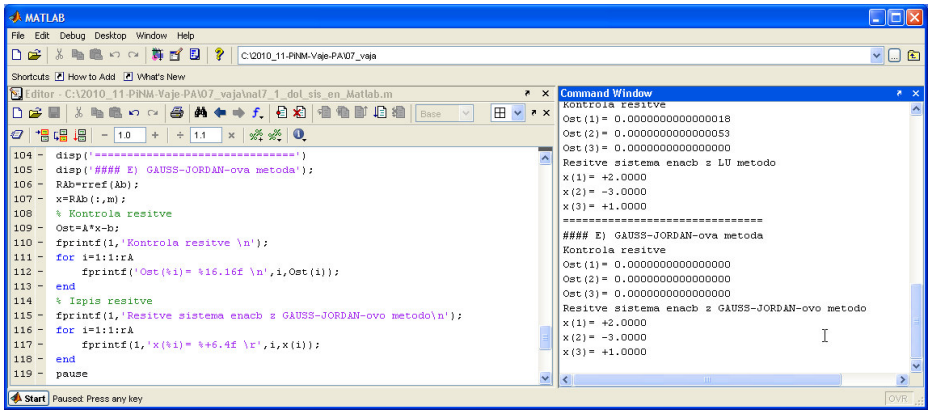
8-1-C


MATLAB
File Edit Debug Desktop Window Help
C:\2010_11-PiNM-Vaje-PA\07_vaja
Shortcuts How to Add What's New
Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\nal7_1_dol_sis_en_Matlab.m
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 - % Izpis resitve
79 - fprintf(1,'Resitve sistema enacb z QR metodo\n');
80 - for i=1:1:rA
81 - fprintf(1,'x(%i)= %+6.4f \r',i,x(i));
82 - end
83 - pause
Command Window
x(3)= +1.0000
==========
B) linsolve uporablja LU dekomposicijo z delnim pi
Kontrola resitve
Ost(1)= 0.0000000000000018
Ost(2)= 0.0000000000000053
Ost(3)= 0.0000000000000000
Resitve sistema enacb z linsolve
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
==========
C) QR metoda
Kontrola resitve
Ost(1)= 0.0000000000000000
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
Start Paused: Press any key
OVR

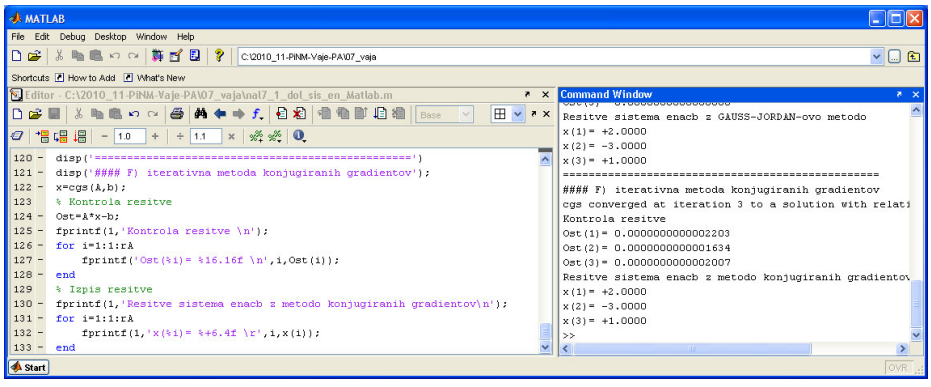
8-1-D


MATLAB
File Edit Debug Desktop Window Help
C:\2010_11-PiNM-Vaje-PA\07_vaja
Shortcuts How to Add What's New
Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\nal7_1_dol_sis_en_Matlab.m
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 - % Izpis 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
Command Window
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
Start Paused: Press any key
OVR

8-1-E


MATLAB
File Edit Debug Desktop Window Help
C:\2010_11-PiNM-Vaje-PA\07_vaja
Shortcuts How to Add What's New
Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\nal7_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 % Izpis resitve
115 - fprintf(1,'Resitve sistema enacb 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
Start Paused: Press any key
Command Window
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
================================
E) GAUSS-JORDAN-ova metoda
Kontrola resitve
Ost(1)= 0.0000000000000000
Ost(2)= 0.0000000000000000
Ost(3)= 0.0000000000000000
Resitve sistema enacb z GAUSS-JORDAN-ovo metodo
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000

8-1-F


MATLAB
File Edit Debug Desktop Window Help
C:\2010_11-PiNM-Vaje-PA\07_vaja
Shortcuts How to Add What's New
Editor - C:\2010_11-PiNM-Vaje-PA\07_vaja\nal7_1_dol_sis_en_Matlab.m
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 % Izpis 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
Start
Command Window
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 relati
Kontrola resitve
Ost(1)= 0.0000000000002203
Ost(2)= 0.0000000000001634
Ost(3)= 0.0000000000002007
Resitve sistema enacb z metodo konjugiranih gradientov
x(1)= +2.0000
x(2)= -3.0000
x(3)= +1.0000
>>