Упражнение 11.1(а)

A=[1 2 3;1 -3 2;1 1 1];

B=[7 5 3]';

D=[A B]; n=3;

R=[rank(A) rank(D) n]

X=inv(A)\*B

A1 = A; A2 = A; A3 = A;

A1(:,1) = B; A2(:,2) = B; A3(:,3) = B;

x1 = det(A1) / det(A);

x2 = det(A2) / det(A);

x3 = det(A3) / det(A);

x=[x1;x2;x3]

R = 3 3 3 (система определена => 1 решение)

X =

1.0000

0

2.0000

x =

1.0000

0

2.0000

Упражнение 11.1(б)

A=[1 2 3;1 -3 2;2 4 6];

B=[7 5 14]';

D=[A B]; n=3;

R=[rank(A) rank(D) n]

X=inv(A)\*B

A1 = A; A2 = A; A3 = A;

A1(:,1) = B; A2(:,2) = B; A3(:,3) = B;

x1 = det(A1) / det(A);

x2 = det(A2) / det(A);

x3 = det(A3) / det(A);

x=[x1;x2;x3]

R = 2 2 3 (система не определена => бесконечное число решений)

Упражнение 11.3(в)

A=[3 -2 1 1; 5 1 2 0;-1 1 -1 1;2 -1 6 -3];

B=[-8 -11 0 9]';

D=[A B]; n=4;

R=[rank(A) rank(D) n]

X=inv(A)\*B

A1 = A; A2 = A; A3 = A; A4 = A;

A1(:,1) = B; A2(:,2) = B; A3(:,3) = B; A4(:,4) = B;

x1 = det(A1) / det(A);

x2 = det(A2) / det(A);

x3 = det(A3) / det(A);

x4 = det(A4) / det(A);

x=[x1;x2;x3;x4]

R = 4 4 4 (система определена => 1 решение)

X =

-3.0000

-0.0000

2.0000

-1.0000

x =

-3.0000

-0.0000

2.0000

-1.0000

Упражнение 11.1(г)

A=[3 -2 1 1; 5 1 2 0;9 -6 3 3;2 -1 6 -3];

B=[-8 -11 0 9]';

D=[A B]; n=4;

R=[rank(A) rank(D) n]

X=inv(A)\*B

A1 = A; A2 = A; A3 = A; A4 = A;

A1(:,1) = B; A2(:,2) = B; A3(:,3) = B; A4(:,4) = B;

x1 = det(A1) / det(A);

x2 = det(A2) / det(A);

x3 = det(A3) / det(A);

x4 = det(A4) / det(A);

x=[x1;x2;x3;x4]

R = 3 4 4 (система не совместна => не имеет решений)

Упражнение 11.1(д)

A=[2 -3 1;1 1 1;-4 6 -2];

B=[2 2 -4]';

D=[A B]; n=3;

R=[rank(A) rank(D) n]

X=inv(A)\*B

A1 = A; A2 = A; A3 = A;

A1(:,1) = B; A2(:,2) = B; A3(:,3) = B;

x1 = det(A1) / det(A);

x2 = det(A2) / det(A);

x3 = det(A3) / det(A);

x=[x1;x2;x3]

R = 2 2 3 (система не определена => бесконечное число решений)

Упражнение 11.1(е)

A=[2 1 -1 -3;4 0 1 -7;0 2 -3 1;2 3 -4 -2];

B=[2 3 1 3]';

D=[A B]; n=4;

R=[rank(A) rank(D) n]

X=inv(A)\*B

A1 = A; A2 = A; A3 = A; A4 = A;

A1(:,1) = B; A2(:,2) = B; A3(:,3) = B; A4(:,4) = B;

x1 = det(A1) / det(A);

x2 = det(A2) / det(A);

x3 = det(A3) / det(A);

x4 = det(A4) / det(A);

x=[x1;x2;x3;x4]

R = 2 2 4 (система не определена => бесконечное число решений)

Упражнение 11.2

А)

[x1,x2,x3]=solve('x1+2\*x2+3\*x3=7','x1-3\*x2+2\*x3=5','x1+x2+x3=3')

x1 = 1

x2 = 0

x3 = 2

Б)

[x1,x2,x3]=solve('x1+2\*x2+3\*x3=7','x1-3\*x2+2\*x3=5','2\*x1+4\*x2+6\*x3=14')

x1 = 31/5 - (13\*z)/5

x2 = 2/5 - z/5

x3 = z

В)

syms x1 x2 x3 x4

[x1,x2,x3,x4] = solve('3\*x1-2\*x2+x3+x4=-8','5\*x1+x2+2\*x3=-11','-x1+x2-x3+x4=0','2\*x1-x2+6\*x3-3\*x4=9',x1,x2,x3,x4)

B3 = [3\*x1-2\*x2+x3+x4; 5\*x1+x2+2\*x3; -x1+x2-x3+x4; 2\*x1-x2+6\*x3-3\*x4]

x1 = -3

x2 = 0

x3 = 2

x4 = -1

B3 = -8 -11 0 9

Г)

syms x1 x2 x3 x4

[x1,x2,x3,x4] = solve('3\*x1-2\*x2+x3+x4=-8','5\*x1+x2+2\*x3=-11','9\*x1-6\*x2+3\*x3+3\*x4=0','2\*x1-x2+6\*x3-3\*x4=9',x1,x2,x3,x4)

B4 = [3\*x1-2\*x2+x3+x4; 5\*x1+x2+2\*x3; 9\*x1-6\*x2+3\*x3+3\*x4; 2\*x1-x2+6\*x3-3\*x4]

Warning: Explicit solution could not be found.

> In solve at 81

In Untitled2 at 2

Д)

syms x1 x2 x3 x4

[x1,x2]=solve('2\*x1-3\*x2+x3=2','x1+x2+x3=2','-4\*x1+6\*x2-2\*x3=-4',x1,x2)

x1 = 8/5 - (4\*x3)/5

x2 = 2/5 - x3/5

Е)

syms x1 x2 x3 x4

[x1,x2,x3,x4]=solve('2\*x1+x2-x3-3\*x4=2','4\*x1+x3-7\*x4=3','2\*x2-3\*x3+x4=1','2\*x1+3\*x2-4\*x3-2\*x4=3',x1,x2,x3,x4)

x1 = (7\*z2)/4 - z/4 + 3/4

x2 = (3\*z)/2 - z2/2 + 1/2

x3 = z

x4 = z2

Упражнение 11.3(а)

syms x1 x2 x3 c

A=[2 -3 1; 1 1 1;3 -2 2];

rank(A)

A=rref(A)

x1=-A(1,3)\*x3

x2=-A(2,3)\*x3

F=[x1,x2,x3]

G=c\*F

ans = 2 (ранг матрицы)

A =

1.0000 0 0.8000

0 1.0000 0.2000

0 0 0

x1 = -(4\*x3)/5

x2 = -x3/5

F = [ -(4\*x3)/5, -x3/5, x3] (фундаментальное решение)

G = [ -(4\*c\*x3)/5, -(c\*x3)/5, c\*x3] (общее решение)

Упражнение 11.3(б)

syms x1 x2 x3 x4 c

A=[1 2 4 -3;3 5 6 -4;4 4 -2 3;3 8 24 -19];

rank(A)

A=rref(A)

x1=-A(1,4)\*x4

x2=-A(2,4)\*x4

x3=-A(3,4)\*x4

F=[x1,x2,x3,x4]

G=c\*F

ans = 3 (ранг матрицы)

A =

1.0000 0 0 0.3333

0 1.0000 0 0

0 0 1.0000 -0.8333

0 0 0 0

x1 = -x4/3

x2 = 0

x3 = (5\*x4)/6

F = [ -x4/3, 0, (5\*x4)/6, x4]

G = [ -(c\*x4)/3, 0, (5\*c\*x4)/6, c\*x4]

Упражнение 11.4(а)

n=4; %кол-во переменных

A=[3 -2 1 1;5 1 2 0;-1 1 -1 1;2 -1 6 -3];

B=[-8 ;-11; 0; 9]; %свободные члены

AA= rref([A B])

x = AA(1:n,end)

X=A\B

AA =

1 0 0 0 -3

0 1 0 0 0

0 0 1 0 2

0 0 0 1 -1

x =

-3

0

2

-1

X =

-3.0000

-0.0000

2.0000

-1.0000

Упражнение 11.4(б)

n=4;

A=[2 3 -1 1;2 7 -3 0;0 4 -2 -1;2 -1 1 2; 4 10 -4 1];

B=[0 ; 1; 1; -1;1];

AA= rref([A B] )

x = AA(1:n,end)

X=A\B

AA =

1.0000 0 0.2500 0.8750 -0.3750

0 1.0000 -0.5000 -0.2500 0.2500

0 0 0 0 0

0 0 0 0 0

0 0 0 0 0

x =

-0.3750

0.2500

0

0