Thomas Penick 452 80 6040
M 340L-C January 23, 1998

Computer Assignment 1

Chapter 1, section 1, problem 1a program file Ch1s1pb01a.m

```
A = [-1 2 1 0;0 -2 -1 2;-1 1 0 3]

B=rowcomb(A,3,1,-2)
% The command rowcomb(A,i,j,c) forms a matrix
% from A by adding c times the ith row of A
% to the jth row.

C=rowscale(B,2,-1/2)
% The command rowscale(A,i,c) multiplies
% row i of the matrix A by the scalar c
% and outputs the resulting matrix.

D=rowcomb(C,1,3,1); D=rowcomb(D,2,3,-1)
E=rowscale(D,3,2)
F=rowcomb(E,3,2,-1/2); F=rowcomb(F,3,1,-1)
```

Result in Matlab

```
» Ch1s1pb01a

A =
    -1     2     1     0
     0    -2    -1     2
    -1     1     0     3


B =
     1     0     1    -6
     0    -2    -1     2
    -1     1     0     3


C =
    1.0000         0    1.0000   -6.0000
         0    1.0000    0.5000   -1.0000
   -1.0000    1.0000         0    3.0000


D =
    1.0000         0    1.0000   -6.0000
         0    1.0000    0.5000   -1.0000
         0         0    0.5000   -2.0000


E =
    1.0000         0    1.0000   -6.0000
         0    1.0000    0.5000   -1.0000
         0         0    1.0000   -4.0000


F =
     1     0     0    -2
     0     1     0     1
     0     0     1    -4

»
```

Reduced Row Echelon Form
One solution:
$x_1 = -2$
$x_2 = 1$
$x_3 = -4$

Thomas Penick 452 80 6040
M 340L-C January 23, 1998

Chapter 1, section 1, problem 1b program file Ch1s1pb01b.m

```
A = [0 -1 -1 1;-1 0 1 0;1 -2 1 -1;1 -1 1 3]

B=rowswap(A,1,2)
% The command rowswap(A,i,j) interchanges
% rows i and j of the matrix A and outputs
% the resulting matrix.

C=rowscale(B,1,-1); C=rowscale(C,2,-1)
% The command rowscale(A,i,c) multiplies
% row i of the matrix A by the scalar c
% and outputs the resulting matrix.

D=rowcomb(C,1,3,-1); D=rowcomb(D,2,3,2)
% The command rowcomb(A,i,j,c) forms a matrix
% from A by adding c times the ith row of A
% to the jth row.

E=rowscale(D,3,1/4)
F=rowcomb(E,1,4,-1); F=rowcomb(F,2,4,1)
G=rowscale(F,4,1/3)
```

Result in Matlab

```
» Ch1s1pb01b

A =
     0    -1    -1     1
    -1     0     1     0
     1    -2     1    -1
     1    -1     1     3
B =
    -1     0     1     0
     0    -1    -1     1
     1    -2     1    -1
     1    -1     1     3
C =
     1     0    -1     0
     0     1     1    -1
     1    -2     1    -1
     1    -1     1     3
D =
     1     0    -1     0
     0     1     1    -1
     0     0     4    -3
     1    -1     1     3
E =
          1.00            0         -1.00            0
             0         1.00          1.00        -1.00
             0            0          1.00        -0.75
          1.00        -1.00          1.00         3.00
F =
          1.00            0         -1.00            0
             0         1.00          1.00        -1.00
             0            0          1.00        -0.75
             0            0          3.00         2.00
G =
          1.00            0         -1.00            0
             0         1.00          1.00        -1.00
             0            0          1.00        -0.75
             0            0          1.00         0.67
»
```

Row Echelon Form
It is not possible for
x_3 = -0.75 and x_3 = 0.67
therefore the system is inconsistent and there are no solutions.

Thomas Penick 452 80 6040
M 340L-C January 23, 1998

Chapter 1, section 1, problem 1c program file Ch1s1pb01c.m

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

B=rowscale(A,1,-1)
% The command rowscale(A,i,c) multiplies
% row i of the matrix A by the scalar c
% and outputs the resulting matrix.

C=rowcomb(B,1,2,2)
% The command rowcomb(A,i,j,c) forms a matrix
% from A by adding c times the ith row of A
% to the jth row.

D=rowscale(C,2,-1)
E=rowcomb(D,2,1,2)
```

Result in Matlab

```
» Ch1s1pb01c

A =
    -1     3     2    -3
    -2     6     3    -1


B =
     1    -3    -2     3
    -2     6     3    -1


C =
     1    -3    -2     3
     0     0    -1     5


D =
     1    -3    -2     3
     0     0     1    -5


E =
     1    -3     0    -7
     0     0     1    -5

»
```

Reduced Row Echelon Form
Infinite solutions:
$x_1 = -7 + 3t_2$
$x_2 = t$
$x_3 = -5$

Thomas Penick 452 80 6040
M 340L-C January 23, 1998

Chapter 1, section 1, problem 1d program file Ch1s1pb01d.m

```
A = [3 2 1 8;0 -2 2 -2;-3 -1 -2 -7;3 1 2 7]

B=rowscale(A,1,1/3); B=rowscale(B,2,-1/2)
% The command rowscale(A,i,c) multiplies
% row i of the matrix A by the scalar c
% and outputs the resulting matrix.

C=rowcomb(B,4,3,1)
D=rowcomb(C,1,4,-3)
E=rowcomb(D,2,4,1)
F=rowcomb(E,2,1,-2/3)
% The command rowcomb(A,i,j,c) forms a matrix
% from A by adding c times the ith row of A
% to the jth row.
```

Result in Matlab

```
» Ch1s1pb01d

A =
     3     2     1     8
     0    -2     2    -2
    -3    -1    -2    -7
     3     1     2     7


B =
    1.0000    0.6667    0.3333    2.6667
         0    1.0000   -1.0000    1.0000
   -3.0000   -1.0000   -2.0000   -7.0000
    3.0000    1.0000    2.0000    7.0000


C =
    1.0000    0.6667    0.3333    2.6667
         0    1.0000   -1.0000    1.0000
         0         0         0         0
    3.0000    1.0000    2.0000    7.0000


D =
    1.0000    0.6667    0.3333    2.6667
         0    1.0000   -1.0000    1.0000
         0         0         0         0
         0   -1.0000    1.0000   -1.0000


E =
    1.0000    0.6667    0.3333    2.6667
         0    1.0000   -1.0000    1.0000
         0         0         0         0
         0         0         0         0

F =
     1     0     1     2
     0     1    -1     1
     0     0     0     0
     0     0     0     0

»
```

Reduced Row Echelon Form
Infinite solutions:
$x_1 = 2 - t$
$x_2 = 1 + t$
$x_3 = t$

Thomas Penick 452 80 6040
M 340L-C January 23, 1998

Chapter 1, section 1, problem 2 program file Ch1s1pb02.m

```
A = randint(3,4,5)
b = randint(3,1,5)
% RANDINT(m,n,k,r) is an m by n matrix of rank r
% with integer entries in the interval [-k:k].
% If less than three arguments are used the default
% value of k is taken to be 9.
% If only one input argument is used then it is assumed
% that the matrix is square.
% If the last argument is left off, no attempt is made
% to determine the rank.

C = rref(A)
% rref is Reduced Row Echelon Form
D = [A,b]
% I just want to see what [A,b] means
E = rref([A,b])
```

Result in Matlab

```
» Ch1s1pb02

A =
     0    -2     2    -4
     2    -3    -2     2
    -1    -3     0    -1


b =
     4
     4
     1


C =
    1.0000         0         0   -0.0909
         0    1.0000         0    0.3636
         0         0    1.0000   -1.6364


D =
     0    -2     2    -4     4
     2    -3    -2     2     4
    -1    -3     0    -1     1


E =
    1.0000         0         0   -0.0909    1.7273
         0    1.0000         0    0.3636   -0.9091
         0         0    1.0000   -1.6364    1.0909

»
```

Reduced Row Echelon Form
For Ax = b:
Infinite solutions:
$x_1 = 1.7273 + 0.0909t$
$x_2 = -0.0901 - 0.3636t$
$x_3 = 1.0909 + 1.6364t$
$x_4 = t$

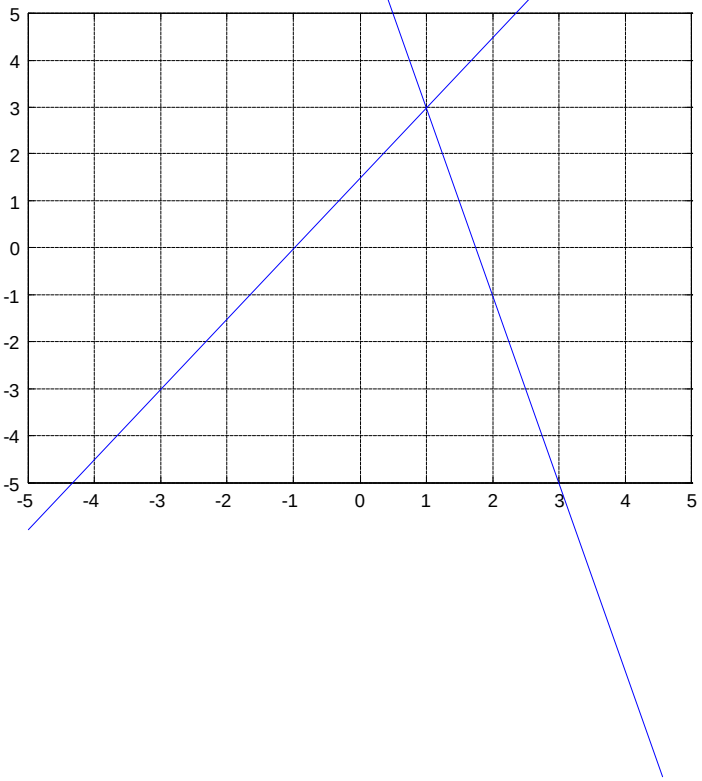
For Ax = 0:
Infinite solutions:
$x_1 = 0.0909t$
$x_2 = -0.3636t$
$x_3 = 1.6364t$
$x_4 = t$

Thomas Penick 452 80 6040
M 340L-C January 23, 1998

Chapter 1, section 2, problem 1a program file Ch1s2pb01a.m

```
plotline(4,1,7)
% plotline(a,b,c,s)
% plots the line ax + by = c with axis
% set to [-s,s,-s,s].  If the last input
% arguments is omitted, its default value
% is taken to be 5.
hold on
% "hold on" permits an additional plot to be
% added to the current plot
plotline(3,-2,-3)
grid
% "grid" toggles whether grid lines are on or off
hold off
```

Result in Matlab



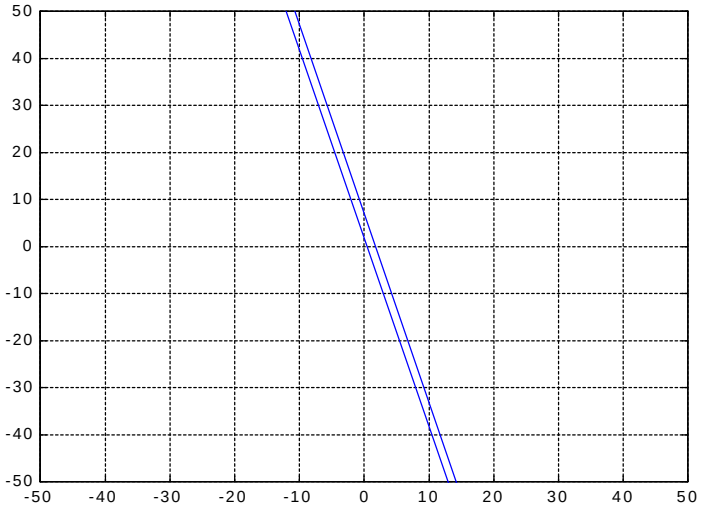
One solution:
$x = 1$
$y = 3$

Thomas Penick 452 80 6040
M 340L-C January 23, 1998

Chapter 1, section 2, problem 1b program file Ch1s2pb01b.m

```
plotline(4,1,7,50)
hold on
plotline(-8,-2,-4,50)
grid
hold off
```

Result in Matlab

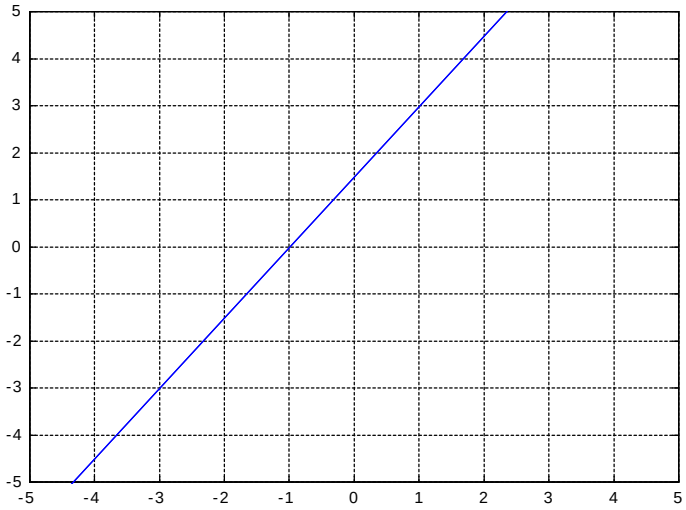


No solutions:
(parallel lines)

Chapter 1, section 2, problem 1c program file Ch1s2pb01c.m

```
plotline(3,-2,-3)
hold on
plotline(-6,4,6)
grid
hold off
```

Result in Matlab



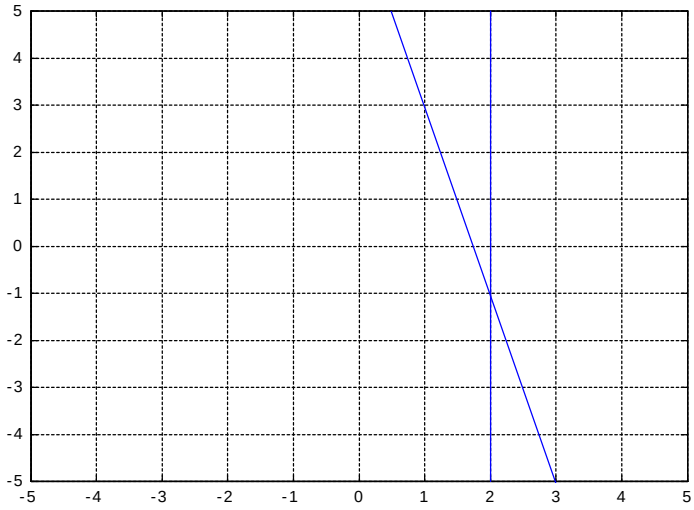
Infinite solutions:
2 overlying lines

Thomas Penick 452 80 6040
M 340L-C January 23, 1998

Chapter 1, section 2, problem 1d program file Ch1s2pb01d.m

```
plotline(4,1,7)
hold on
plotline(1,0,2)
grid
hold off
```

Result in Matlab

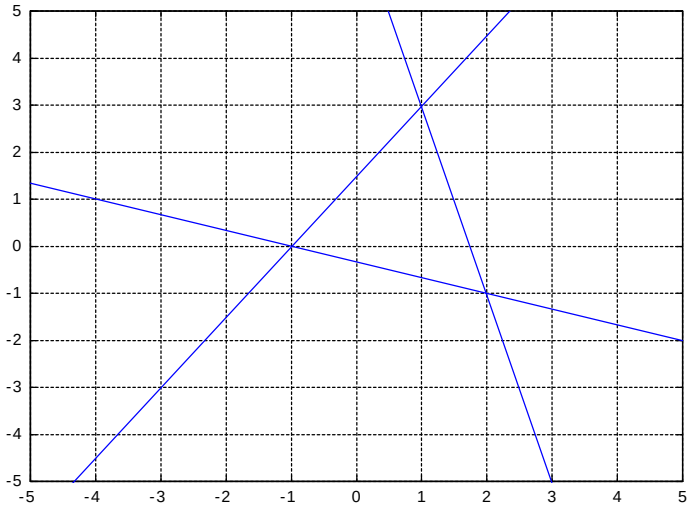


One solution:
$x = 2$
$y = -1$

Chapter 1, section 2, problem 1e program file Ch1s2pb01e.m

```
plotline(4,1,7)
hold on
plotline(3,-2,-3)
plotline(1,3,-1)
grid
hold off
```

Result in Matlab



No solutions:
The three lines do not intersect at a common point.