

```

%% FUNCTION 'Guass.m' %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
function Guass()
%Notes:
%1. Solves a NxN matrix using row reduction techniques.

%% START SCRIPT %%
clear all;                %[] clears all memory
close all;                %[] closes all figures that are open
clc;                      %[] clear command history

%% CONSTANTS %%
TIMEDELAY=0.1;            %[]s time delay between displays

%% INPUT %%
A=[4.2 2 4 6 5 6;2 -4 5 7 3 -9;4 5 7 7 4 -6;5 7 -4 7 4 6; ...
  4 5 2 5 -6 9;4 5 7 1 3 1];
B=[2.2;3;6;6;0;-1];

%% MAIN %%
%Display A and B Matrix to User
disp(A);                  %[] display "A" matrix
pause(TIMEDELAY);         %[] pause for TIMEDELAY
disp(B);                  %[] display "B" matrix (column vector)
pause(TIMEDELAY);         %[] pause for TIMEDELAY

%Determine Size of "A" Matrix
[ny,nx]=size(A);          %[]ny = # of rows, nx = # of columns]

%Create Row Echelon (RE) Form Matrix
RE=zeros(ny,nx+1);        %[] create blank matrix plus 1 column
RE(1:1:ny,1:1:nx)=A(1:1:ny,1:1:nx); %[] fill in "A" matrix
RE(1:ny,nx+1)=B(1:1:ny,1); %[] fill in "B" matrix

%Display Row Echelon Matrix to User
disp(RE);                 %[] display "RE" matrix
pause(TIMEDELAY);         %[] pause for TIMEDELAY

%% FORWARD ELIMINATION %%
counter=0;                %[] will count number of operations
rowvec=1:1:nx+1;          %[] row vector (will always use)
disp('START FORWARD ELIMINATION'); %[] display to user
for ix=1:1:nx              %[] for "i"ndex "x" from "1" to "nx"
    for iy=ix:1:ny          %[] for "i"ndex "y" from "ix" to "ny"
        %Preform Forward Elimination
        if ix==iy           %[] if on diagonal, then value=one
            RE(iy,rowvec)=RE(iy,rowvec)/RE(iy,ix);
        else                %[] if not, make value=0 by subtract
            RE(iy,rowvec)=RE(iy,rowvec)-RE(iy,ix).*RE(ix,rowvec);
        end %end if
        counter=counter+1;   %[] operations plus one

        %Display Row Echelon Matrix to User
        disp(['counter = ' num2str(counter,'%03.0f')]);
        disp(RE);           %[] display "RE" matrix
        pause(TIMEDELAY);    %[] pause for TIMEDELAY
    end                     %[] end for loop
end                         %[] end for loop
disp('FINISH FORWARD ELIMINATION'); %[] display to user
disp(' ');                  %[] display blank line
disp(' ');                  %[] display blank line

```

[illegible]

4.2000	2.0000	4.0000	6.0000	5.0000	6.0000
2.0000	-4.0000	5.0000	7.0000	3.0000	-9.0000
4.0000	5.0000	7.0000	7.0000	4.0000	-6.0000
5.0000	7.0000	-4.0000	7.0000	4.0000	6.0000
4.0000	5.0000	2.0000	5.0000	-6.0000	9.0000
4.0000	5.0000	7.0000	1.0000	3.0000	1.0000

2.2000
3.0000
6.0000
6.0000
0
-1.0000

4.2000	2.0000	4.0000	6.0000	5.0000	6.0000	2.2000
2.0000	-4.0000	5.0000	7.0000	3.0000	-9.0000	3.0000
4.0000	5.0000	7.0000	7.0000	4.0000	-6.0000	6.0000
5.0000	7.0000	-4.0000	7.0000	4.0000	6.0000	6.0000
4.0000	5.0000	2.0000	5.0000	-6.0000	9.0000	0
4.0000	5.0000	7.0000	1.0000	3.0000	1.0000	-1.0000

START FORWARD ELIMINATION

counter = 001

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
2.0000	-4.0000	5.0000	7.0000	3.0000	-9.0000	3.0000
4.0000	5.0000	7.0000	7.0000	4.0000	-6.0000	6.0000
5.0000	7.0000	-4.0000	7.0000	4.0000	6.0000	6.0000
4.0000	5.0000	2.0000	5.0000	-6.0000	9.0000	0
4.0000	5.0000	7.0000	1.0000	3.0000	1.0000	-1.0000

counter = 002

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	-4.9524	3.0952	4.1429	0.6190	-11.8571	1.9524
4.0000	5.0000	7.0000	7.0000	4.0000	-6.0000	6.0000
5.0000	7.0000	-4.0000	7.0000	4.0000	6.0000	6.0000

4.0000	5.0000	2.0000	5.0000	-6.0000	9.0000	0
4.0000	5.0000	7.0000	1.0000	3.0000	1.0000	-1.0000

counter = 003

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	-4.9524	3.0952	4.1429	0.6190	-11.8571	1.9524
0	3.0952	3.1905	1.2857	-0.7619	-11.7143	3.9048
5.0000	7.0000	-4.0000	7.0000	4.0000	6.0000	6.0000
4.0000	5.0000	2.0000	5.0000	-6.0000	9.0000	0
4.0000	5.0000	7.0000	1.0000	3.0000	1.0000	-1.0000

counter = 004

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	-4.9524	3.0952	4.1429	0.6190	-11.8571	1.9524
0	3.0952	3.1905	1.2857	-0.7619	-11.7143	3.9048
0	4.6190	-8.7619	-0.1429	-1.9524	-1.1429	3.3810
4.0000	5.0000	2.0000	5.0000	-6.0000	9.0000	0
4.0000	5.0000	7.0000	1.0000	3.0000	1.0000	-1.0000

counter = 005

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	-4.9524	3.0952	4.1429	0.6190	-11.8571	1.9524
0	3.0952	3.1905	1.2857	-0.7619	-11.7143	3.9048
0	4.6190	-8.7619	-0.1429	-1.9524	-1.1429	3.3810
0	3.0952	-1.8095	-0.7143	-10.7619	3.2857	-2.0952
4.0000	5.0000	7.0000	1.0000	3.0000	1.0000	-1.0000

counter = 006

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	-4.9524	3.0952	4.1429	0.6190	-11.8571	1.9524
0	3.0952	3.1905	1.2857	-0.7619	-11.7143	3.9048
0	4.6190	-8.7619	-0.1429	-1.9524	-1.1429	3.3810
0	3.0952	-1.8095	-0.7143	-10.7619	3.2857	-2.0952
0	3.0952	3.1905	-4.7143	-1.7619	-4.7143	-3.0952

counter = 007

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	3.0952	3.1905	1.2857	-0.7619	-11.7143	3.9048
0	4.6190	-8.7619	-0.1429	-1.9524	-1.1429	3.3810
0	3.0952	-1.8095	-0.7143	-10.7619	3.2857	-2.0952
0	3.0952	3.1905	-4.7143	-1.7619	-4.7143	-3.0952

counter = 008

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	5.1250	3.8750	-0.3750	-19.1250	5.1250
0	4.6190	-8.7619	-0.1429	-1.9524	-1.1429	3.3810
0	3.0952	-1.8095	-0.7143	-10.7619	3.2857	-2.0952
0	3.0952	3.1905	-4.7143	-1.7619	-4.7143	-3.0952

counter = 009

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	5.1250	3.8750	-0.3750	-19.1250	5.1250
0	0	-5.8750	3.7212	-1.3750	-12.2019	5.2019
0	3.0952	-1.8095	-0.7143	-10.7619	3.2857	-2.0952
0	3.0952	3.1905	-4.7143	-1.7619	-4.7143	-3.0952

counter = 010

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	5.1250	3.8750	-0.3750	-19.1250	5.1250
0	0	-5.8750	3.7212	-1.3750	-12.2019	5.2019
0	0	0.1250	1.8750	-10.3750	-4.1250	-0.8750
0	3.0952	3.1905	-4.7143	-1.7619	-4.7143	-3.0952

counter = 011

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942

0	0	5.1250	3.8750	-0.3750	-19.1250	5.1250
0	0	-5.8750	3.7212	-1.3750	-12.2019	5.2019
0	0	0.1250	1.8750	-10.3750	-4.1250	-0.8750
0	0	5.1250	-2.1250	-1.3750	-12.1250	-1.8750

counter = 012

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	-5.8750	3.7212	-1.3750	-12.2019	5.2019
0	0	0.1250	1.8750	-10.3750	-4.1250	-0.8750
0	0	5.1250	-2.1250	-1.3750	-12.1250	-1.8750

counter = 013

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	8.1632	-1.8049	-34.1257	11.0769
0	0	0.1250	1.8750	-10.3750	-4.1250	-0.8750
0	0	5.1250	-2.1250	-1.3750	-12.1250	-1.8750

counter = 014

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	8.1632	-1.8049	-34.1257	11.0769
0	0	0	1.7805	-10.3659	-3.6585	-1.0000
0	0	5.1250	-2.1250	-1.3750	-12.1250	-1.8750

counter = 015

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	8.1632	-1.8049	-34.1257	11.0769
0	0	0	1.7805	-10.3659	-3.6585	-1.0000

0	0	0	-6.0000	-1.0000	7.0000	-7.0000
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counter = 016

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	1.0000	-0.2211	-4.1804	1.3569
0	0	0	1.7805	-10.3659	-3.6585	-1.0000
0	0	0	-6.0000	-1.0000	7.0000	-7.0000

counter = 017

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	1.0000	-0.2211	-4.1804	1.3569
0	0	0	0	-9.9722	3.7846	-3.4160
0	0	0	-6.0000	-1.0000	7.0000	-7.0000

counter = 018

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	1.0000	-0.2211	-4.1804	1.3569
0	0	0	0	-9.9722	3.7846	-3.4160
0	0	0	0	-2.3266	-18.0825	1.1416

counter = 019

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	1.0000	-0.2211	-4.1804	1.3569
0	0	0	0	1.0000	-0.3795	0.3426
0	0	0	0	-2.3266	-18.0825	1.1416

counter = 020

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	1.0000	-0.2211	-4.1804	1.3569
0	0	0	0	1.0000	-0.3795	0.3426
0	0	0	0	0	-18.9655	1.9386

counter = 021

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	1.0000	-0.2211	-4.1804	1.3569
0	0	0	0	1.0000	-0.3795	0.3426
0	0	0	0	0	1.0000	-0.1022

FINISH FORWARD ELIMINATION

START BACK SUBSTITUTION

counter = 022

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	1.0000	-0.2211	-4.1804	1.3569
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 023

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	-3.7317	1.0000
0	0	0	1.0000	-0.2211	0	0.9296
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 024

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	2.3942	-0.3942
0	0	1.0000	0.7561	-0.0732	0	0.6186
0	0	0	1.0000	-0.2211	0	0.9296
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 025

1.0000	0.4762	0.9524	1.4286	1.1905	1.4286	0.5238
0	1.0000	-0.6250	-0.8365	-0.1250	0	-0.1495
0	0	1.0000	0.7561	-0.0732	0	0.6186
0	0	0	1.0000	-0.2211	0	0.9296
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 026

1.0000	0.4762	0.9524	1.4286	1.1905	0	0.6698
0	1.0000	-0.6250	-0.8365	-0.1250	0	-0.1495
0	0	1.0000	0.7561	-0.0732	0	0.6186
0	0	0	1.0000	-0.2211	0	0.9296
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 027

1.0000	0.4762	0.9524	1.4286	1.1905	0	0.6698
0	1.0000	-0.6250	-0.8365	-0.1250	0	-0.1495
0	0	1.0000	0.7561	-0.0732	0	0.6186
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 028

1.0000	0.4762	0.9524	1.4286	1.1905	0	0.6698
0	1.0000	-0.6250	-0.8365	-0.1250	0	-0.1495

0	0	1.0000	0.7561	0	0	0.6408
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 029

1.0000	0.4762	0.9524	1.4286	1.1905	0	0.6698
0	1.0000	-0.6250	-0.8365	0	0	-0.1115
0	0	1.0000	0.7561	0	0	0.6408
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 030

1.0000	0.4762	0.9524	1.4286	0	0	0.3082
0	1.0000	-0.6250	-0.8365	0	0	-0.1115
0	0	1.0000	0.7561	0	0	0.6408
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 031

1.0000	0.4762	0.9524	1.4286	0	0	0.3082
0	1.0000	-0.6250	-0.8365	0	0	-0.1115
0	0	1.0000	0	0	0	-0.1129
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 032

1.0000	0.4762	0.9524	1.4286	0	0	0.3082
0	1.0000	-0.6250	0	0	0	0.7223
0	0	1.0000	0	0	0	-0.1129
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038

0	0	0	0	0	1.0000	-0.1022
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counter = 033

1.0000	0.4762	0.9524	0	0	0	-1.1158
0	1.0000	-0.6250	0	0	0	0.7223
0	0	1.0000	0	0	0	-0.1129
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 034

1.0000	0.4762	0.9524	0	0	0	-1.1158
0	1.0000	0	0	0	0	0.6518
0	0	1.0000	0	0	0	-0.1129
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 035

1.0000	0.4762	0	0	0	0	-1.0083
0	1.0000	0	0	0	0	0.6518
0	0	1.0000	0	0	0	-0.1129
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

counter = 036

1.0000	0	0	0	0	0	-1.3186
0	1.0000	0	0	0	0	0.6518
0	0	1.0000	0	0	0	-0.1129
0	0	0	1.0000	0	0	0.9968
0	0	0	0	1.0000	0	0.3038
0	0	0	0	0	1.0000	-0.1022

FINISH BACK SUBSTITUTION

CHECK SOLUTION

-1.3186

0.6518

-0.1129

0.9968

0.3038

-0.1022

>>