
```

clc;
clear;

%A = [[1,9,8,1];[3,6,5,5];[7,6,5,8];[4,5,6,7]];
%B = [1;0;1;0];

%A = [[1,2];[2,4]];
%B = [1;2]

%A = [[0,4,-2];[6,-2,1];[4,8,-4]];
%B = [2;29;24];

%A = [[-2,-17,4,3];[7,0,3,-2];[0,2,8,-6];[5,-13,-1,5]]
%B = [0;0;-20;16]

%%Test Problems:

%2A
A = [[1,2,-1,1];[-1,1,2,-1];[2,-1,2,2];[1,1,-1,2]];
B = [6;3;14;8];
gaussJordanN(A,B)
%2B
A = [[1,2,-3,4];[2,2,-2,3];[0,1,1,0];[1,-1,1,-2]];
B = [12;10;-1;-4];
gaussJordanN(A,B)

%3A
A = [[2,0,1];[1,5,1];[-1,4,0]];
B = [[1,0,0];[0,1,0];[0,0,1]];
gaussJordanN(A,B)
%3B
A = [[29,-11,10];[-160,61,-55];[55,-21,19]];
B = [[1,0,0];[0,1,0];[0,0,1]];
gaussJordanN(A,B)

%4
A = [[0,0,-7,1];[0,0,5,0];[-7,5,0,2];[1,0,2,0]];
B = [0;0;0;0]; %for finding rowspace basis, no b vector needed. just set to
0 so not inconsistent system
gaussJordanN(A,B)

%5
A = [[85,-28,-28];[10,-11,-11];[-46,-2,-2]];
B = [0;0;0];
gaussJordanN(A,B)

A = [[85 + 49 - sqrt(833)*i,-28,-28];[10,-11+ 49 - sqrt(833)*i,-11];
[-46,-2,-2+ 49 - sqrt(833)*i]];
B = [0;0;0];
gaussJordanN(A,B)

A = [[85 - 49 - sqrt(833)*i,-28,-28];[10,-11- 49 - sqrt(833)*i,-11];

```

```

[-46,-2,-2- 49 - sqrt(833)*i]];
B = [0;0;0];
gaussJordanN(A,B)

%disp("Actual Answer:");
%disp((A^-1)*B);

%%Will first make sure top row has a leading number
function gaussJordanN(A,B)
    if A(1,1) == 0
        holdingA = A(1,:);
        holdingB = B(1,:);
        nonLeadingZeroesRows = find(A(:,1) ~=0);
        %swap with the last row with a non leading 0
        A(1,:) = A(nonLeadingZeroesRows(end),:);
        B(1,:) = B(nonLeadingZeroesRows(end),:);
        A(nonLeadingZeroesRows(end),:) = holdingA;
        B(nonLeadingZeroesRows(end),:) = holdingB;
        disp( strcat("P(1," + num2str(nonLeadingZeroesRows(end)) + ") ...
In Matlab: " , "A(1,:) = " , "A(" , num2str(nonLeadingZeroesRows(end)) ,
",:) ; ",...
                "B(1,:) = " , "B(" , num2str(nonLeadingZeroesRows(end)) ,
",:)") )
        A
        B
    end
    if A(1,1) ~=1
        disp( strcat("M_1(" + num2str(1/A(1,1)),") ... In Matlab: "
, "B(1,:) = " , "(1/A(1,1))" , "*B(1,:)" , " ; A(1,:) = " , "1/A(1,1))" ,
"*A(1,:)" )
        B(1,:) = 1/A(1,1) * B(1,:);
        A(1,:) = 1/A(1,1) * A(1,:);
        B
    end
    %%Gets into triangular form
    for i = 1:length(A) - 1 % i is the column of interest. Want to ignore
the last column
        %will make all leading numbers except first row to be 0, and so on...
        if abs(A(i,i)) <= 10^-3
            holdingA = A(i,:);
            holdingB = B(i,:);
            nonLeadingZeroesRows = find(A(:,i) ~=0);
            %swap with the last row with a non leading 0
            A(i,:) = A(nonLeadingZeroesRows(end),:);
            B(i,:) = B(nonLeadingZeroesRows(end),:);
            A(nonLeadingZeroesRows(end),:) = holdingA;
            B(nonLeadingZeroesRows(end),:) = holdingB;
            disp( strcat("P(1," + num2str(nonLeadingZeroesRows(end))
+ ") ... In Matlab: " , "A(1,:) = " , "A(" ,
num2str(nonLeadingZeroesRows(end)) , ",:) ; ",...
                    "B(1,:) = " , "B(" , num2str(nonLeadingZeroesRows(end)) ,
",:)") )
            A
            B
        end
    end
end

```

```

end
for ii = 1:height(A)-1
    currentRow = height(A) - (ii - 1); % 0 to height(A)-1 would do the
entire, from bottom to top, so subtract again
    if A(currentRow,i) ~=0 && currentRow ~= i
        %disp(A(currentRow,:))
        fac = -1*A(currentRow,i)/A(i,i);
        B(currentRow,:) = fac * B(i,:) + B(currentRow,:);
        A(currentRow,:) = fac * A(i,:) + A(currentRow,:);
        if abs(fac)>0
            disp(strcat("A_", num2str(i) , " to " ,
num2str(currentRow) , " (" , num2str(fac) , ") ... In Matlab: " , "B("
, num2str(currentRow) , ", :) = " , "-1*A(" , num2str(currentRow) , ", " ,
num2str(i) , ")" , "* B(" , num2str(i) , ", :)" , ...
" ; A(" , num2str(currentRow) , ", :) = " ,
"-1*A(" , num2str(currentRow) , ", " , num2str(i) , ")" , "* A(" , num2str(i) , ", :)" )
A
B
        end
        arr = find(abs(A(currentRow,:)) > 10^-3); %cant use ~=0,
since floating point.
        if length(arr) == 0
            continue;
        end
        mult = A(currentRow,arr(1) );
        B(currentRow,:) = B(currentRow,:) * 1/mult;
        A(currentRow,:) = A(currentRow,:) * 1/mult;
        if mult ~=1
            disp(strcat("M_", num2str(currentRow) , " (1/" ,
num2str(mult) , ") ... In Matlab: " , "B(" , num2str(currentRow) , ", :)
= " , " (1/" , "A(" , num2str(currentRow) , ", " , num2str(arr(1)) , ") *B("
, num2str(currentRow) , ", :)" , ...
" ; A(" , num2str(currentRow) , ", :) = " ,
"(1/" , "A(" , num2str(currentRow) , ", " , num2str(arr(1)) , ") *A("
, num2str(currentRow) , ", :)" )
A
B
        end
    end
end
end
end
%%Will find any rows of all zeroes, and deletes them for now
z = [];
for i = 1:height(A)
    %need a tolerance since doing floating point
    if abs(sum(A(i,:)) ) <= 10^-3
        z = [z,i];
    end
end
if length(z) ~=0
    for i = 1:length(z)
        if abs( sum(B(z(i) - (i-1) , :) ) ) >=10^-3
            disp("system is inconsistent")
        end
    end
end

```

```

        A(z(i) - (i-1) , :) = [];
        B(z(i) - (i-1) , :) = [];
    end
    % for i = 1:length(z)
    %     A(height(A) + i, :) = zeros(1,length(A));
    % end
    disp("removed zero row")
    A
    B
end

%%Gets into RREF
for i = 2:height(A)
    i;
    for ii = 1:i-1
        rowToAddTo = ii;
        fac = -1*A(ii,i)/A(i,i);
        A(rowToAddTo,:) = A(rowToAddTo,:) + fac*A(i,:);
        B(rowToAddTo,:) = B(rowToAddTo,:) + fac*B(i,:);
        if abs(fac)>0
            disp(strcat("A_", num2str(i) , " to " , num2str(ii) , "
(" , num2str(fac) , " ) ... In Matlab: " , "B(",num2str(ii),",:)
= " , "-1*A(",num2str(ii),"",num2str(i)," /A(",num2str(i),"",num2str(i)," ) "
, "*B(",num2str(ii),"",":)" , "...
" ; A(",num2str(ii),"",":) = "
, "-1*A(",num2str(ii),"",num2str(i)," /A(",num2str(i),"",num2str(i)," ) "
, "*A(",num2str(ii),"",":)" ) )
            A
            B
        end
    end
end
end
A
B
end

A_1 to 4 (-1) ... In Matlab: B(4,:) = -1*A(4,1)* B(1,:) ; A(4,:) =
-1*A(4,1)* A(1,:)

```

A =

1	2	-1	1
-1	1	2	-1
2	-1	2	2
0	-1	0	1

B =

6
3
14
2

M_4 (1/-1) ... In Matlab: $B(4,:) = (1/A(4,2))*B(4,:)$; $A(4,:) = (1/A(4,2))*A(4,:)$

A =

1	2	-1	1
-1	1	2	-1
2	-1	2	2
0	1	0	-1

B =

6
3
14
-2

A_1 to 3 (-2) ... In Matlab: $B(3,:) = -1*A(3,1)*B(1,:)$; $A(3,:) = -1*A(3,1)*A(1,:)$

A =

1	2	-1	1
-1	1	2	-1
0	-5	4	0
0	1	0	-1

B =

6
3
2
-2

M_3 (1/-5) ... In Matlab: $B(3,:) = (1/A(3,2))*B(3,:)$; $A(3,:) = (1/A(3,2))*A(3,:)$

A =

1.0000	2.0000	-1.0000	1.0000
-1.0000	1.0000	2.0000	-1.0000
0	1.0000	-0.8000	0
0	1.0000	0	-1.0000

B =

6.0000
3.0000
-0.4000
-2.0000

$A_{1 \text{ to } 2} (1) \dots$ In Matlab: $B(2,:) = -1*A(2,1)*B(1,:)$; $A(2,:) = -1*A(2,1)*A(1,:)$

A =

1.0000	2.0000	-1.0000	1.0000
0	3.0000	1.0000	0
0	1.0000	-0.8000	0
0	1.0000	0	-1.0000

B =

6.0000
9.0000
-0.4000
-2.0000

$M_2 (1/3) \dots$ In Matlab: $B(2,:) = (1/A(2,2))*B(2,:)$; $A(2,:) = (1/A(2,2))*A(2,:)$

A =

1.0000	2.0000	-1.0000	1.0000
0	1.0000	0.3333	0
0	1.0000	-0.8000	0
0	1.0000	0	-1.0000

B =

6.0000
3.0000
-0.4000
-2.0000

$A_{2 \text{ to } 4} (-1) \dots$ In Matlab: $B(4,:) = -1*A(4,2)*B(2,:)$; $A(4,:) = -1*A(4,2)*A(2,:)$

A =

1.0000	2.0000	-1.0000	1.0000
0	1.0000	0.3333	0
0	1.0000	-0.8000	0
0	0	-0.3333	-1.0000

B =

6.0000
3.0000
-0.4000
-5.0000

M_4 (1/-0.3333) ... In Matlab: $B(4,:) = (1/A(4,3))*B(4,:)$; $A(4,:) = (1/A(4,3))*A(4,:)$

A =

1.0000	2.0000	-1.0000	1.0000
0	1.0000	0.3333	0
0	1.0000	-0.8000	0
0	0	1.0000	3.0000

B =

6.0000
3.0000
-0.4000
15.0000

A_2 to 3 (-1) ... In Matlab: $B(3,:) = -1*A(3,2)*B(2,:)$; $A(3,:) = -1*A(3,2)*A(2,:)$

A =

1.0000	2.0000	-1.0000	1.0000
0	1.0000	0.3333	0
0	0	-1.1333	0
0	0	1.0000	3.0000

B =

6.0000
3.0000
-3.4000
15.0000

M_3 (1/-1.1333) ... In Matlab: $B(3,:) = (1/A(3,3))*B(3,:)$; $A(3,:) = (1/A(3,3))*A(3,:)$

A =

1.0000	2.0000	-1.0000	1.0000
0	1.0000	0.3333	0
0	0	1.0000	0
0	0	1.0000	3.0000

B =

6
3
3
15

$A_{3 \text{ to } 4} (-1) \dots$ In Matlab: $B(4,:) = -1*A(4,3)*B(3,:)$; $A(4,:) = -1*A(4,3)*A(3,:)$

A =

1.0000	2.0000	-1.0000	1.0000
0	1.0000	0.3333	0
0	0	1.0000	0
0	0	0	3.0000

B =

6
3
3
12

$M_4 (1/3) \dots$ In Matlab: $B(4,:) = (1/A(4,4))*B(4,:)$; $A(4,:) = (1/A(4,4))*A(4,:)$

A =

1.0000	2.0000	-1.0000	1.0000
0	1.0000	0.3333	0
0	0	1.0000	0
0	0	0	1.0000

B =

6
3
3
4

$A_{3 \text{ to } 2} (-0.33333) \dots$ In Matlab: $B(2,:) = -1*A(2,3)*B(3,:)$; $A(2,:) = -1*A(2,3)*A(3,:)$

A =

1	2	-1	1
0	1	0	0
0	0	1	0
0	0	0	1

B =

6
2
3
4

$A_{2 \text{ to } 1} (-2) \dots$ In Matlab: $B(1,:) = -1*A(1,2/A(2,2))*B(1,:)$; $A(1,:) = -1*A(1,2/A(2,2))*A(1,:)$

A =

1	0	-1	1
0	1	0	0
0	0	1	0
0	0	0	1

B =

2
2
3
4

$A_{3 \text{ to } 1} (1) \dots$ In Matlab: $B(1,:) = -1*A(1,3/A(3,3))*B(1,:)$; $A(1,:) = -1*A(1,3/A(3,3))*A(1,:)$

A =

1	0	0	1
0	1	0	0
0	0	1	0
0	0	0	1

B =

5
2
3
4

$A_{4 \text{ to } 1} (-1) \dots$ In Matlab: $B(1,:) = -1*A(1,4/A(4,4))*B(1,:)$; $A(1,:) = -1*A(1,4/A(4,4))*A(1,:)$

A =

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

B =

1
2
3
4

A =

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

B =

1
2
3
4

A_1 to 4 (-1) ... In Matlab: $B(4,:) = -1*A(4,1)*B(1,:)$; $A(4,:) = -1*A(4,1)*A(1,:)$

A =

1	2	-3	4
2	2	-2	3
0	1	1	0
0	-3	4	-6

B =

12
10
-1
-16

M_4 (1/-3) ... In Matlab: $B(4,:) = (1/A(4,2))*B(4,:)$; $A(4,:) = (1/A(4,2))*A(4,:)$

A =

1.0000	2.0000	-3.0000	4.0000
2.0000	2.0000	-2.0000	3.0000
0	1.0000	1.0000	0
0	1.0000	-1.3333	2.0000

B =

12.0000
10.0000
-1.0000
5.3333

A_1 to 2 (-2) ... In Matlab: $B(2,:) = -1*A(2,1)*B(1,:)$; $A(2,:) = -1*A(2,1)*A(1,:)$

A =

1.0000	2.0000	-3.0000	4.0000
0	-2.0000	4.0000	-5.0000
0	1.0000	1.0000	0
0	1.0000	-1.3333	2.0000

B =

12.0000
-14.0000
-1.0000
5.3333

M_2 (1/-2) ... In Matlab: B(2,:) = (1/A(2,2))*B(2,:) ; A(2,:) = (1/A(2,2))*A(2,:)

A =

1.0000	2.0000	-3.0000	4.0000
0	1.0000	-2.0000	2.5000
0	1.0000	1.0000	0
0	1.0000	-1.3333	2.0000

B =

12.0000
7.0000
-1.0000
5.3333

A_2 to 4 (-1) ... In Matlab: B(4,:) = -1*A(4,2)* B(2,:) ; A(4,:) = -1*A(4,2)* A(2,:)

A =

1.0000	2.0000	-3.0000	4.0000
0	1.0000	-2.0000	2.5000
0	1.0000	1.0000	0
0	0	0.6667	-0.5000

B =

12.0000
7.0000
-1.0000
-1.6667

M_4 (1/0.66667) ... In Matlab: B(4,:) = (1/A(4,3))*B(4,:) ; A(4,:) = (1/A(4,3))*A(4,:)

A =

1.0000	2.0000	-3.0000	4.0000
0	1.0000	-2.0000	2.5000
0	1.0000	1.0000	0
0	0	1.0000	-0.7500

B =

12.0000
7.0000
-1.0000
-2.5000

A_2 to 3 (-1) ... In Matlab: $B(3,:) = -1 \cdot A(3,2) \cdot B(2,:)$; $A(3,:) = -1 \cdot A(3,2) \cdot A(2,:)$

A =

1.0000	2.0000	-3.0000	4.0000
0	1.0000	-2.0000	2.5000
0	0	3.0000	-2.5000
0	0	1.0000	-0.7500

B =

12.0000
7.0000
-8.0000
-2.5000

M_3 (1/3) ... In Matlab: $B(3,:) = (1/A(3,3)) \cdot B(3,:)$; $A(3,:) = (1/A(3,3)) \cdot A(3,:)$

A =

1.0000	2.0000	-3.0000	4.0000
0	1.0000	-2.0000	2.5000
0	0	1.0000	-0.8333
0	0	1.0000	-0.7500

B =

12.0000
7.0000
-2.6667
-2.5000

A_3 to 4 (-1) ... In Matlab: $B(4,:) = -1 \cdot A(4,3) \cdot B(3,:)$; $A(4,:) = -1 \cdot A(4,3) \cdot A(3,:)$

A =

1.0000	2.0000	-3.0000	4.0000
0	1.0000	-2.0000	2.5000
0	0	1.0000	-0.8333
0	0	0	0.0833

B =

12.0000
7.0000
-2.6667
0.1667

M_4 (1/0.083333) ... In Matlab: B(4,:) = (1/A(4,4))*B(4,:) ; A(4,:) = (1/A(4,4))*A(4,:)

A =

1.0000	2.0000	-3.0000	4.0000
0	1.0000	-2.0000	2.5000
0	0	1.0000	-0.8333
0	0	0	1.0000

B =

12.0000
7.0000
-2.6667
2.0000

A_3 to 2 (2) ... In Matlab: B(2,:) = -1*A(2,3)*B(3,:) ; A(2,:) = -1*A(2,3)*A(3,:)

A =

1.0000	2.0000	-3.0000	4.0000
0	1.0000	0	0.8333
0	0	1.0000	-0.8333
0	0	0	1.0000

B =

12.0000
1.6667
-2.6667
2.0000

A_2 to 1 (-2) ... In Matlab: B(1,:) = -1*A(1,2/A(2,2))*B(1,:) ; A(1,:) = -1*A(1,2/A(2,2))*A(1,:)

A =

1.0000	0	-3.0000	2.3333
0	1.0000	0	0.8333
0	0	1.0000	-0.8333
0	0	0	1.0000

B =

8.6667
1.6667
-2.6667
2.0000

A_3 to 1 (3) ... In Matlab: $B(1,:) = -1*A(1,3)/A(3,3)*B(1,:)$; $A(1,:) = -1*A(1,3)/A(3,3)*A(1,:)$

A =

1.0000	0	0	-0.1667
0	1.0000	0	0.8333
0	0	1.0000	-0.8333
0	0	0	1.0000

B =

0.6667
1.6667
-2.6667
2.0000

A_4 to 1 (0.16667) ... In Matlab: $B(1,:) = -1*A(1,4)/A(4,4)*B(1,:)$; $A(1,:) = -1*A(1,4)/A(4,4)*A(1,:)$

A =

1.0000	0	0	0
0	1.0000	0	0.8333
0	0	1.0000	-0.8333
0	0	0	1.0000

B =

1.0000
1.6667
-2.6667
2.0000

A_4 to 2 (-0.83333) ... In Matlab: $B(2,:) = -1*A(2,4)/A(4,4)*B(2,:)$; $A(2,:) = -1*A(2,4)/A(4,4)*A(2,:)$

A =

```
1.0000    0    0    0
    0    1.0000    0    0
    0    0    1.0000 -0.8333
    0    0    0    1.0000
```

B =

```
1.0000
0.0000
-2.6667
2.0000
```

A_4 to 3 (0.83333) ... In Matlab: $B(3,:) = -1 \cdot A(3,4)/A(4,4) \cdot B(3,:)$; $A(3,:) = -1 \cdot A(3,4)/A(4,4) \cdot A(3,:)$

A =

```
1    0    0    0
0    1    0    0
0    0    1    0
0    0    0    1
```

B =

```
1.0000
0.0000
-1.0000
2.0000
```

A =

```
1    0    0    0
0    1    0    0
0    0    1    0
0    0    0    1
```

B =

```
1.0000
0.0000
-1.0000
2.0000
```

M_1(0.5) ... In Matlab: $B(1,:) = (1/A(1,1)) \cdot B(1,:)$; $A(1,:) = 1/A(1,1) \cdot A(1,:)$

A =

1.0000	0	0.5000
1.0000	5.0000	1.0000
-1.0000	4.0000	0

$B =$

0.5000	0	0
0	1.0000	0
0	0	1.0000

A_1 to 3 (1) ... In Matlab: $B(3,:) = -1*A(3,1)*B(1,:)$; $A(3,:) = -1*A(3,1)*A(1,:)$

$A =$

1.0000	0	0.5000
1.0000	5.0000	1.0000
0	4.0000	0.5000

$B =$

0.5000	0	0
0	1.0000	0
0.5000	0	1.0000

M_3 (1/4) ... In Matlab: $B(3,:) = (1/A(3,2))*B(3,:)$; $A(3,:) = (1/A(3,2))*A(3,:)$

$A =$

1.0000	0	0.5000
1.0000	5.0000	1.0000
0	1.0000	0.1250

$B =$

0.5000	0	0
0	1.0000	0
0.1250	0	0.2500

A_1 to 2 (-1) ... In Matlab: $B(2,:) = -1*A(2,1)*B(1,:)$; $A(2,:) = -1*A(2,1)*A(1,:)$

$A =$

1.0000	0	0.5000
0	5.0000	0.5000
0	1.0000	0.1250

$B =$

0.5000	0	0
-0.5000	1.0000	0
0.1250	0	0.2500

M_2 (1/5) ... In Matlab: $B(2,:) = (1/A(2,2))*B(2,:)$; $A(2,:) = (1/A(2,2))*A(2,:)$

$A =$

1.0000	0	0.5000
0	1.0000	0.1000
0	1.0000	0.1250

$B =$

0.5000	0	0
-0.1000	0.2000	0
0.1250	0	0.2500

A_2 to 3 (-1) ... In Matlab: $B(3,:) = -1*A(3,2)*B(2,:)$; $A(3,:) = -1*A(3,2)*A(2,:)$

$A =$

1.0000	0	0.5000
0	1.0000	0.1000
0	0	0.0250

$B =$

0.5000	0	0
-0.1000	0.2000	0
0.2250	-0.2000	0.2500

M_3 (1/0.025) ... In Matlab: $B(3,:) = (1/A(3,3))*B(3,:)$; $A(3,:) = (1/A(3,3))*A(3,:)$

$A =$

1.0000	0	0.5000
0	1.0000	0.1000
0	0	1.0000

$B =$

0.5000	0	0
-0.1000	0.2000	0
9.0000	-8.0000	10.0000

A_3 to 1 (-0.5) ... In Matlab: $B(1,:) = -1*A(1,3/A(3,3))*B(1,); A(1,:) = -1*A(1,3/A(3,3))*A(1,)$

A =

1.0000	0	0
0	1.0000	0.1000
0	0	1.0000

B =

-4.0000	4.0000	-5.0000
-0.1000	0.2000	0
9.0000	-8.0000	10.0000

A_3 to 2 (-0.1) ... In Matlab: $B(2,:) = -1*A(2,3/A(3,3))*B(2,); A(2,:) = -1*A(2,3/A(3,3))*A(2,)$

A =

1	0	0
0	1	0
0	0	1

B =

-4.0000	4.0000	-5.0000
-1.0000	1.0000	-1.0000
9.0000	-8.0000	10.0000

A =

1	0	0
0	1	0
0	0	1

B =

-4.0000	4.0000	-5.0000
-1.0000	1.0000	-1.0000
9.0000	-8.0000	10.0000

$M_1(0.034483)$... In Matlab: $B(1,:) = (1/A(1,1))*B(1,); A(1,:) = 1/A(1,1))*A(1,)$

A =

1.0000	-0.3793	0.3448
-160.0000	61.0000	-55.0000
55.0000	-21.0000	19.0000

$B =$

0.0345	0	0
0	1.0000	0
0	0	1.0000

A_1 to 3 (-55) ... In Matlab: $B(3,:) = -1*A(3,1)*B(1,:)$; $A(3,:) = -1*A(3,1)*A(1,:)$

$A =$

1.0000	-0.3793	0.3448
-160.0000	61.0000	-55.0000
0	-0.1379	0.0345

$B =$

0.0345	0	0
0	1.0000	0
-1.8966	0	1.0000

M_3 (1/-0.13793) ... In Matlab: $B(3,:) = (1/A(3,2))*B(3,:)$; $A(3,:) = (1/A(3,2))*A(3,:)$

$A =$

1.0000	-0.3793	0.3448
-160.0000	61.0000	-55.0000
0	1.0000	-0.2500

$B =$

0.0345	0	0
0	1.0000	0
13.7500	0	-7.2500

A_1 to 2 (160) ... In Matlab: $B(2,:) = -1*A(2,1)*B(1,:)$; $A(2,:) = -1*A(2,1)*A(1,:)$

$A =$

1.0000	-0.3793	0.3448
0	0.3103	0.1724
0	1.0000	-0.2500

$B =$

0.0345	0	0
5.5172	1.0000	0

13.7500 0 -7.2500

M_2 (1/0.31034) ... In Matlab: $B(2,:) = (1/A(2,2))*B(2,:)$; $A(2,:) = (1/A(2,2))*A(2,:)$

A =

1.0000 -0.3793 0.3448
0 1.0000 0.5556
0 1.0000 -0.2500

B =

0.0345 0 0
17.7778 3.2222 0
13.7500 0 -7.2500

A_2 to 3 (-1) ... In Matlab: $B(3,:) = -1*A(3,2)*B(2,:)$; $A(3,:) = -1*A(3,2)*A(2,:)$

A =

1.0000 -0.3793 0.3448
0 1.0000 0.5556
0 0 -0.8056

B =

0.0345 0 0
17.7778 3.2222 0
-4.0278 -3.2222 -7.2500

M_3 (1/-0.80556) ... In Matlab: $B(3,:) = (1/A(3,3))*B(3,:)$; $A(3,:) = (1/A(3,3))*A(3,:)$

A =

1.0000 -0.3793 0.3448
0 1.0000 0.5556
0 0 1.0000

B =

0.0345 0 0
17.7778 3.2222 0
5.0000 4.0000 9.0000

A_2 to 1 (0.37931) ... In Matlab: $B(1,:) = -1*A(1,2/A(2,2))*B(1,:)$; $A(1,:) = -1*A(1,2/A(2,2))*A(1,:)$

A =

1.0000	0	0.5556
0	1.0000	0.5556
0	0	1.0000

$B =$

6.7778	1.2222	0
17.7778	3.2222	0
5.0000	4.0000	9.0000

A_3 to 1 (-0.55556) ... In Matlab: $B(1,:) = -1*A(1,3/A(3,3))*B(1,:)$; $A(1,:) = -1*A(1,3/A(3,3))*A(1,:)$

$A =$

1.0000	0	0
0	1.0000	0.5556
0	0	1.0000

$B =$

4.0000	-1.0000	-5.0000
17.7778	3.2222	0
5.0000	4.0000	9.0000

A_3 to 2 (-0.55556) ... In Matlab: $B(2,:) = -1*A(2,3/A(3,3))*B(2,:)$; $A(2,:) = -1*A(2,3/A(3,3))*A(2,:)$

$A =$

1	0	0
0	1	0
0	0	1

$B =$

4.0000	-1.0000	-5.0000
15.0000	1.0000	-5.0000
5.0000	4.0000	9.0000

$A =$

1	0	0
0	1	0
0	0	1

$B =$

4.0000	-1.0000	-5.0000
15.0000	1.0000	-5.0000
5.0000	4.0000	9.0000

A =

1	0	2	0
0	0	5	0
-7	5	0	2
1	0	2	0

B =

0
0
0
0

P(1,4) ... In Matlab: A(1,:) = A(4,:) ; B(1,:) = B(4,:)

A =

1	0	2	0
0	0	5	0
-7	5	0	2
0	0	-7	1

B =

0
0
0
0

A_1 to 3 (7) ... In Matlab: B(3,:) = -1*A(3,1)* B(1,:) ; A(3,:) = -1*A(3,1)* A(1,:)

A =

1	0	2	0
0	0	5	0
0	5	14	2
0	0	-7	1

B =

0
0
0
0

$M_3 (1/5) \dots$ In Matlab: $B(3,:) = (1/A(3,2))*B(3,:)$; $A(3,:) = (1/A(3,2))*A(3,:)$

A =

1.0000	0	2.0000	0
0	0	5.0000	0
0	1.0000	2.8000	0.4000
0	0	-7.0000	1.0000

B =

0
0
0
0

A =

1.0000	0	2.0000	0
0	1.0000	2.8000	0.4000
0	1.0000	2.8000	0.4000
0	0	-7.0000	1.0000

B =

0
0
0
0

$P(1,3) \dots$ In Matlab: $A(1,:) = A(3,:)$; $B(1,:) = B(3,:)$

A =

1.0000	0	2.0000	0
0	1.0000	2.8000	0.4000
0	0	5.0000	0
0	0	-7.0000	1.0000

B =

0
0
0
0

$A_3 \text{ to } 4 (1.4) \dots$ In Matlab: $B(4,:) = -1*A(4,3)*B(3,:)$; $A(4,:) = -1*A(4,3)*A(3,:)$

A =

1.0000	0	2.0000	0
0	1.0000	2.8000	0.4000
0	0	5.0000	0
0	0	0	1.0000

B =

0
0
0
0

A_3 to 2 (-0.56) ... In Matlab: $B(2,:) = -1 \cdot A(2,3) \cdot B(3,:)$; $A(2,:) = -1 \cdot A(2,3) \cdot A(3,:)$

A =

1.0000	0	2.0000	0
0	1.0000	0	0.4000
0	0	5.0000	0
0	0	0	1.0000

B =

0
0
0
0

A_3 to 1 (-0.4) ... In Matlab: $B(1,:) = -1 \cdot A(1,3/A(3,3)) \cdot B(1,:)$; $A(1,:) = -1 \cdot A(1,3/A(3,3)) \cdot A(1,:)$

A =

1.0000	0	0	0
0	1.0000	0	0.4000
0	0	5.0000	0
0	0	0	1.0000

B =

0
0
0
0

A_4 to 2 (-0.4) ... In Matlab: $B(2,:) = -1 \cdot A(2,4/A(4,4)) \cdot B(2,:)$; $A(2,:) = -1 \cdot A(2,4/A(4,4)) \cdot A(2,:)$

A =

1	0	0	0
0	1	0	0
0	0	5	0
0	0	0	1

B =

0
0
0
0

A =

1	0	0	0
0	1	0	0
0	0	5	0
0	0	0	1

B =

0
0
0
0

$M_1(0.011765) \dots$ In Matlab: $B(1,:) = (1/A(1,1)) * B(1,:)$; $A(1,:) = 1/A(1,1) * A(1,:)$

A =

1.0000	-0.3294	-0.3294
10.0000	-11.0000	-11.0000
-46.0000	-2.0000	-2.0000

B =

0
0
0

A_1 to 3 (46) ... In Matlab: $B(3,:) = -1 * A(3,1) * B(1,:)$; $A(3,:) = -1 * A(3,1) * A(1,:)$

A =

1.0000	-0.3294	-0.3294
--------	---------	---------

```

10.0000  -11.0000  -11.0000
      0   -17.1529  -17.1529

```

$B =$

```

0
0
0

```

M_3 (1/-17.1529) ... In Matlab: $B(3,:) = (1/A(3,2))*B(3,:)$; $A(3,:) = (1/A(3,2))*A(3,:)$

$A =$

```

1.0000  -0.3294  -0.3294
10.0000  -11.0000  -11.0000
      0    1.0000    1.0000

```

$B =$

```

0
0
0

```

A_1 to 2 (-10) ... In Matlab: $B(2,:) = -1*A(2,1)*B(1,:)$; $A(2,:) = -1*A(2,1)*A(1,:)$

$A =$

```

1.0000  -0.3294  -0.3294
      0   -7.7059  -7.7059
      0    1.0000    1.0000

```

$B =$

```

0
0
0

```

M_2 (1/-7.7059) ... In Matlab: $B(2,:) = (1/A(2,2))*B(2,:)$; $A(2,:) = (1/A(2,2))*A(2,:)$

$A =$

```

1.0000  -0.3294  -0.3294
      0    1.0000    1.0000
      0    1.0000    1.0000

```

$B =$

0
0
0

A_{2 to 3} (-1) ... In Matlab: $B(3,:) = -1 \cdot A(3,2) \cdot B(2,:)$; $A(3,:) = -1 \cdot A(3,2) \cdot A(2,:)$

A =

1.0000	-0.3294	-0.3294
0	1.0000	1.0000
0	0	0

B =

0
0
0

removed zero row

A =

1.0000	-0.3294	-0.3294
0	1.0000	1.0000

B =

0
0

A_{2 to 1} (0.32941) ... In Matlab: $B(1,:) = -1 \cdot A(1,2/A(2,2)) \cdot B(1,:)$; $A(1,:) = -1 \cdot A(1,2/A(2,2)) \cdot A(1,:)$

A =

1	0	0
0	1	1

B =

0
0

A =

1	0	0
0	1	1

$B =$

0
0

$M_1 (0.0071318+0.0015361i) \dots$ In Matlab: $B(1,:) = (1/A(1,1))*B(1,:)$; $A(1,:) = 1/A(1,1)*A(1,:)$

$A =$

1.0000 - 0.0000i -0.1997 - 0.0430i -0.1997 - 0.0430i
10.0000 + 0.0000i 38.0000 -28.8617i -11.0000 + 0.0000i
-46.0000 + 0.0000i -2.0000 + 0.0000i 47.0000 -28.8617i

$B =$

0
0
0

A_1 to 3 $(46+1.27676e-15i) \dots$ In Matlab: $B(3,:) = -1*A(3,1)*B(1,:)$;
 $A(3,:) = -1*A(3,1)*A(1,:)$

$A =$

1.0000 - 0.0000i -0.1997 - 0.0430i -0.1997 - 0.0430i
10.0000 + 0.0000i 38.0000 -28.8617i -11.0000 + 0.0000i
0.0000 + 0.0000i -11.1858 - 1.9785i 37.8142 -30.8402i

$B =$

0
0
0

$M_3 (1/-11.1858-1.97849i) \dots$ In Matlab: $B(3,:) = (1/A(3,2))*B(3,:)$; $A(3,:) = (1/A(3,2))*A(3,:)$

$A =$

1.0000 - 0.0000i -0.1997 - 0.0430i -0.1997 - 0.0430i
10.0000 + 0.0000i 38.0000 -28.8617i -11.0000 + 0.0000i
0.0000 + 0.0000i 1.0000 + 0.0000i -2.8051 + 3.2532i

$B =$

0
0
0

A_1 to 2 $(-10-2.77556e-16i) \dots$ In Matlab: $B(2,:) = -1*A(2,1)*B(1,:)$;

$A(2,:) = -1*A(2,1)*A(1,:)$

A =

```
1.0000 - 0.0000i  -0.1997 - 0.0430i  -0.1997 - 0.0430i
0.0000 + 0.0000i  39.9969 -28.4316i  -9.0031 + 0.4301i
0.0000 + 0.0000i   1.0000 + 0.0000i  -2.8051 + 3.2532i
```

B =

```
0
0
0
```

M_2 (1/39.9969-28.4316i) ... In Matlab: $B(2,:) = (1/A(2,2))*B(2,:)$; $A(2,:) = (1/A(2,2))*A(2,:)$

A =

```
1.0000 - 0.0000i  -0.1997 - 0.0430i  -0.1997 - 0.0430i
0.0000 + 0.0000i   1.0000 - 0.0000i  -0.1546 - 0.0992i
0.0000 + 0.0000i   1.0000 + 0.0000i  -2.8051 + 3.2532i
```

B =

```
0
0
0
```

A_2 to 3 (-1-7.8256e-17i) ... In Matlab: $B(3,:) = -1*A(3,2)*B(2,:)$; $A(3,:) = -1*A(3,2)*A(2,:)$

A =

```
1.0000 - 0.0000i  -0.1997 - 0.0430i  -0.1997 - 0.0430i
0.0000 + 0.0000i   1.0000 - 0.0000i  -0.1546 - 0.0992i
0.0000 + 0.0000i   0.0000 + 0.0000i  -2.6505 + 3.3524i
```

B =

```
0
0
0
```

M_3 (1/-2.6505+3.3524i) ... In Matlab: $B(3,:) = (1/A(3,3))*B(3,:)$; $A(3,:) = (1/A(3,3))*A(3,:)$

A =

```
1.0000 - 0.0000i  -0.1997 - 0.0430i  -0.1997 - 0.0430i
0.0000 + 0.0000i   1.0000 - 0.0000i  -0.1546 - 0.0992i
```

$0.0000 + 0.0000i \quad 0.0000 + 0.0000i \quad 1.0000 + 0.0000i$

$B =$

0
 0
 0

A_2 to 1 ($0.19969+0.043011i$) ... In Matlab: $B(1,:) = -1*A(1,2/A(2,2)*B(1,:)$; $A(1,:) = -1*A(1,2/A(2,2)*A(1,:)$

$A =$

$1.0000 - 0.0000i \quad 0.0000 + 0.0000i \quad -0.2263 - 0.0695i$
 $0.0000 + 0.0000i \quad 1.0000 - 0.0000i \quad -0.1546 - 0.0992i$
 $0.0000 + 0.0000i \quad 0.0000 + 0.0000i \quad 1.0000 + 0.0000i$

$B =$

0
 0
 0

A_3 to 1 ($0.2263+0.069461i$) ... In Matlab: $B(1,:) = -1*A(1,3/A(3,3)*B(1,:)$; $A(1,:) = -1*A(1,3/A(3,3)*A(1,:)$

$A =$

$1.0000 - 0.0000i \quad 0.0000 + 0.0000i \quad 0.0000 + 0.0000i$
 $0.0000 + 0.0000i \quad 1.0000 - 0.0000i \quad -0.1546 - 0.0992i$
 $0.0000 + 0.0000i \quad 0.0000 + 0.0000i \quad 1.0000 + 0.0000i$

$B =$

0
 0
 0

A_3 to 2 ($0.15461+0.099152i$) ... In Matlab: $B(2,:) = -1*A(2,3/A(3,3)*B(2,:)$; $A(2,:) = -1*A(2,3/A(3,3)*A(2,:)$

$A =$

$1.0000 - 0.0000i \quad 0.0000 + 0.0000i \quad 0.0000 + 0.0000i$
 $0.0000 + 0.0000i \quad 1.0000 - 0.0000i \quad 0.0000 + 0.0000i$
 $0.0000 + 0.0000i \quad 0.0000 + 0.0000i \quad 1.0000 + 0.0000i$

$B =$

0

0
0

A =

1.0000 - 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 1.0000 - 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 1.0000 + 0.0000i

B =

0
0
0

$M_1(0.016909+0.013556i)$... In Matlab: $B(1,:) = (1/A(1,1))*B(1,:)$; $A(1,:) = 1/A(1,1)*A(1,:)$

A =

1.0000 + 0.0000i -0.4735 - 0.3796i -0.4735 - 0.3796i
10.0000 + 0.0000i -60.0000 -28.8617i -11.0000 + 0.0000i
-46.0000 + 0.0000i -2.0000 + 0.0000i -51.0000 -28.8617i

B =

0
0
0

A_1 to 3 (46-2.55351e-15i) ... In Matlab: $B(3,:) = -1*A(3,1)*B(1,:)$;
 $A(3,:) = -1*A(3,1)*A(1,:)$

A =

1.0000 + 0.0000i -0.4735 - 0.3796i -0.4735 - 0.3796i
10.0000 + 0.0000i -60.0000 -28.8617i -11.0000 + 0.0000i
0.0000 + 0.0000i -23.7792 -17.4607i -72.7792 -46.3225i

B =

0
0
0

$M_3(1/-23.7792-17.4607i)$... In Matlab: $B(3,:) = (1/A(3,2))*B(3,:)$; $A(3,:) = (1/A(3,2))*A(3,:)$

A =

```

1.0000 + 0.0000i -0.4735 - 0.3796i -0.4735 - 0.3796i
10.0000 + 0.0000i -60.0000 -28.8617i -11.0000 + 0.0000i
0.0000 + 0.0000i 1.0000 + 0.0000i 2.9178 - 0.1945i

```

$B =$

```

0
0
0

```

A_1 to 2 $(-10+5.55112e-16i)$... In Matlab: $B(2,:) = -1*A(2,1)*B(1,:)$;
 $A(2,:) = -1*A(2,1)*A(1,:)$

$A =$

```

1.0000 + 0.0000i -0.4735 - 0.3796i -0.4735 - 0.3796i
0.0000 + 0.0000i -55.2654 -25.0659i -6.2654 + 3.7958i
0.0000 + 0.0000i 1.0000 + 0.0000i 2.9178 - 0.1945i

```

$B =$

```

0
0
0

```

M_2 $(1/-55.2654-25.0659i)$... In Matlab: $B(2,:) = (1/A(2,2))*B(2,:)$; $A(2,:) =$
 $(1/A(2,2))*A(2,:)$

$A =$

```

1.0000 + 0.0000i -0.4735 - 0.3796i -0.4735 - 0.3796i
0.0000 + 0.0000i 1.0000 + 0.0000i 0.0682 - 0.0996i
0.0000 + 0.0000i 1.0000 + 0.0000i 2.9178 - 0.1945i

```

$B =$

```

0
0
0

```

A_2 to 3 (-1) ... In Matlab: $B(3,:) = -1*A(3,2)*B(2,:)$; $A(3,:) =$
 $-1*A(3,2)*A(2,:)$

$A =$

```

1.0000 + 0.0000i -0.4735 - 0.3796i -0.4735 - 0.3796i
0.0000 + 0.0000i 1.0000 + 0.0000i 0.0682 - 0.0996i
0.0000 + 0.0000i 0.0000 + 0.0000i 2.8496 - 0.0949i

```

$B =$

0
0
0

M_3 (1/2.8496-0.094874i) ... In Matlab: $B(3,:) = (1/A(3,3)*B(3,:))$; $A(3,:) = (1/A(3,3)*A(3,:))$

A =

1.0000 + 0.0000i -0.4735 - 0.3796i -0.4735 - 0.3796i
0.0000 + 0.0000i 1.0000 + 0.0000i 0.0682 - 0.0996i
0.0000 + 0.0000i 0.0000 + 0.0000i 1.0000 + 0.0000i

B =

0
0
0

A_2 to 1 (0.47346+0.37958i) ... In Matlab: $B(1,:) = -1*A(1,2/A(2,2))*B(1,:)$;
 $A(1,:) = -1*A(1,2/A(2,2))*A(1,:)$

A =

1.0000 + 0.0000i 0.0000 + 0.0000i -0.4034 - 0.4009i
0.0000 + 0.0000i 1.0000 + 0.0000i 0.0682 - 0.0996i
0.0000 + 0.0000i 0.0000 + 0.0000i 1.0000 + 0.0000i

B =

0
0
0

A_3 to 1 (0.40337+0.40086i) ... In Matlab: $B(1,:) = -1*A(1,3/A(3,3))*B(1,:)$;
 $A(1,:) = -1*A(1,3/A(3,3))*A(1,:)$

A =

1.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 1.0000 + 0.0000i 0.0682 - 0.0996i
0.0000 + 0.0000i 0.0000 + 0.0000i 1.0000 + 0.0000i

B =

0
0
0

A_3 to 2 (-0.06819+0.099611i) ... In Matlab: $B(2,:) = -1*A(2,3/$

```
A(3,3)*B(2,:) ; A(2,:) = -1*A(2,3)/A(3,3)*A(2,)
```

```
A =
```

```
1.0000 + 0.0000i    0.0000 + 0.0000i    0.0000 + 0.0000i
0.0000 + 0.0000i    1.0000 + 0.0000i    0.0000 + 0.0000i
0.0000 + 0.0000i    0.0000 + 0.0000i    1.0000 + 0.0000i
```

```
B =
```

```
0
0
0
```

```
A =
```

```
1.0000 + 0.0000i    0.0000 + 0.0000i    0.0000 + 0.0000i
0.0000 + 0.0000i    1.0000 + 0.0000i    0.0000 + 0.0000i
0.0000 + 0.0000i    0.0000 + 0.0000i    1.0000 + 0.0000i
```

```
B =
```

```
0
0
0
```

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