LINEAR ALGEBRA
(23MAT117)

LAB MANUAL

Submitted by	
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Roll No	AV.SC.U4CSE24033
Year/Sem/Section	1st Year/2nd Sem/CSE-A
Date of Submission	
Submitted to	
Name	Dr. Rashmi Prasad
Department	Mathematics
Designation	Professor

Marks	

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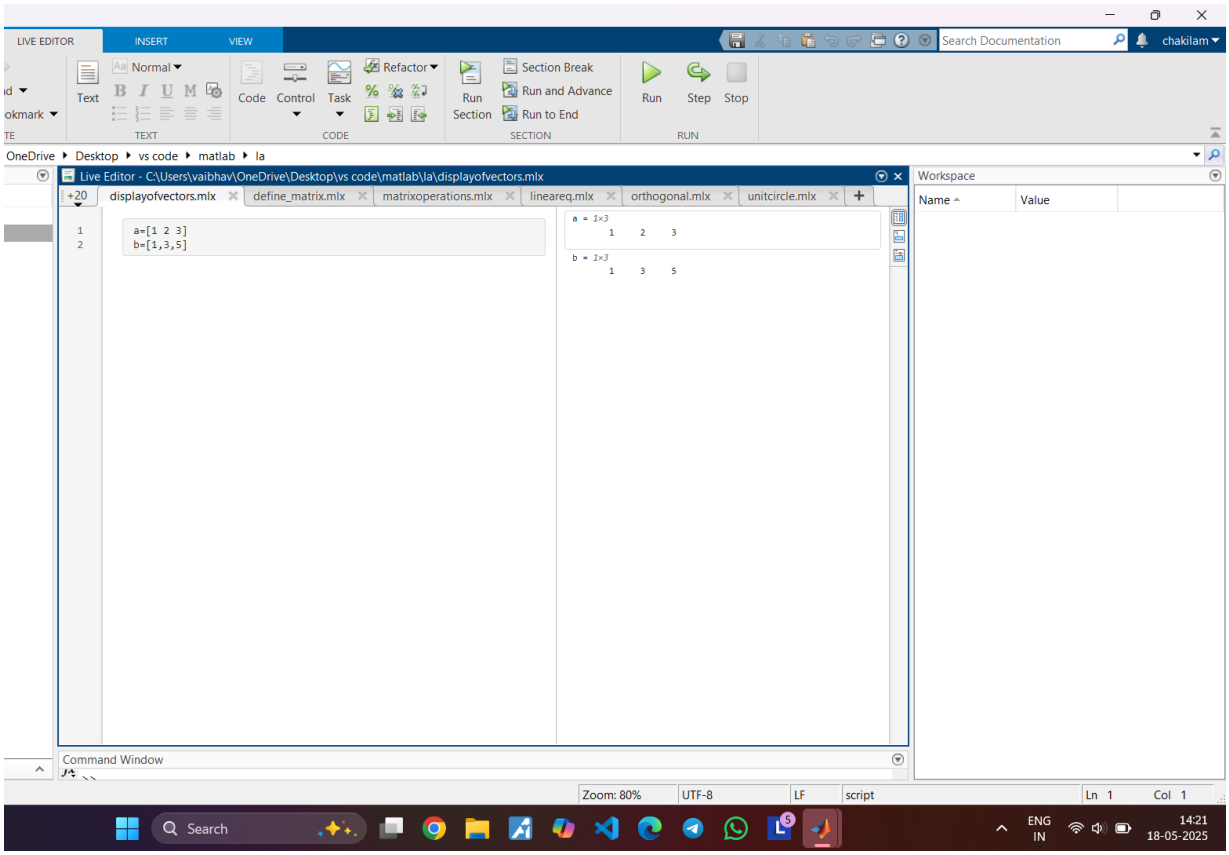
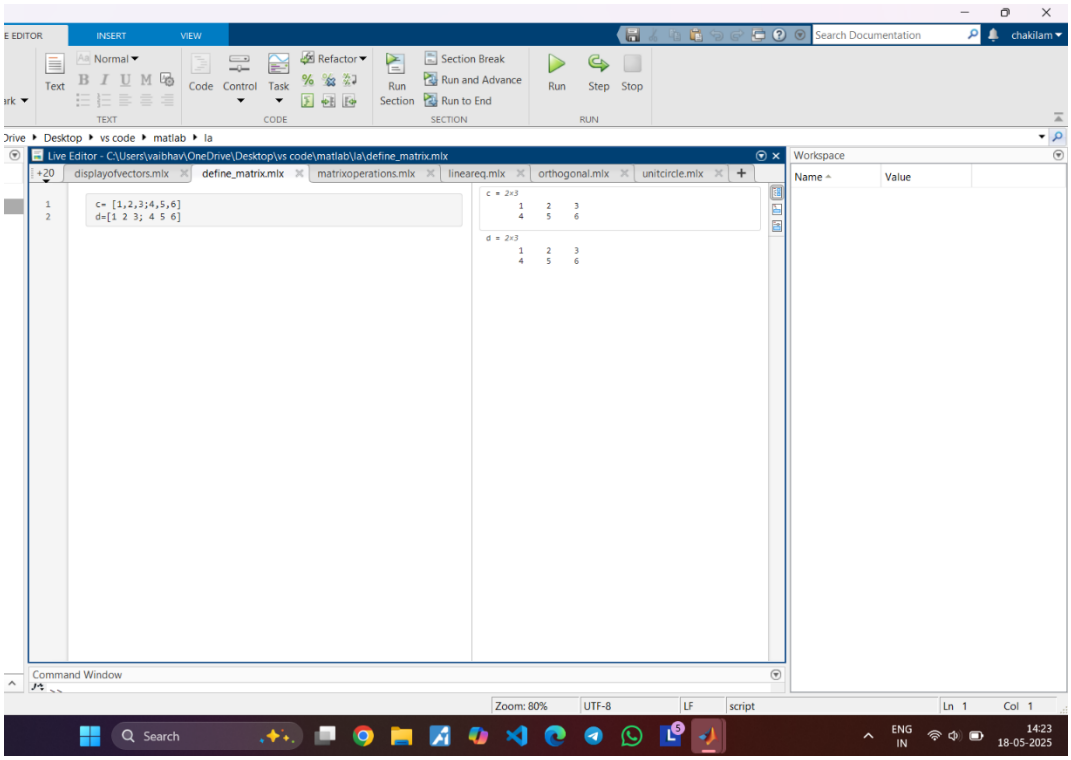
S.No		Signature
1.	Write a MATLAB code to define and display vectors.	
2.	Write a MATLAB code to define and display matrix	
3.	Write a MATLAB code to define and display a random matrix and their operations.	
4.	Write a MATLAB code to find the solutions of given linear system of equations.	
5.	Write a MATLAB code to draw the vectors (3,4) and(-2,5) in a 2-D plane.	
6.	Write a MATLAB code to draw the vectors (3,4) and(-2,5) in a 3-D plane.	
7.	Using MATLAB, define the vectors v1 = [3, 1] and v2 = [1, 2]. Write a program to visualize their span in 2D space.	
8.	Using MATLAB, define the vectors v1=(3,1,2) and v2=(1,4,-1). Write a program to visualize their span in 3D space.	
9.	Using MATLAB, for any given positive integer and for any given basis for R^n. write a program to find the orthonormal basis corresponding to the given basis.	
10.	Using MATLAB, write a program to find the QR decomposition corresponding to the given	
11.	Using MATLAB, write a program to Visualize how a matrix transforms the unit circle.	
12.	Using MATLAB, write a program to Visualize how a matrix transforms a square.	
13.	Using MATLAB, write a program to Visualize how a matrix transforms a triangle	
14.	Using MATLAB, write a program to find diagonalisation of the matrix.	
15.	Using MATLAB, write a program to find orthogonal diagonalisation of a given matrix.	

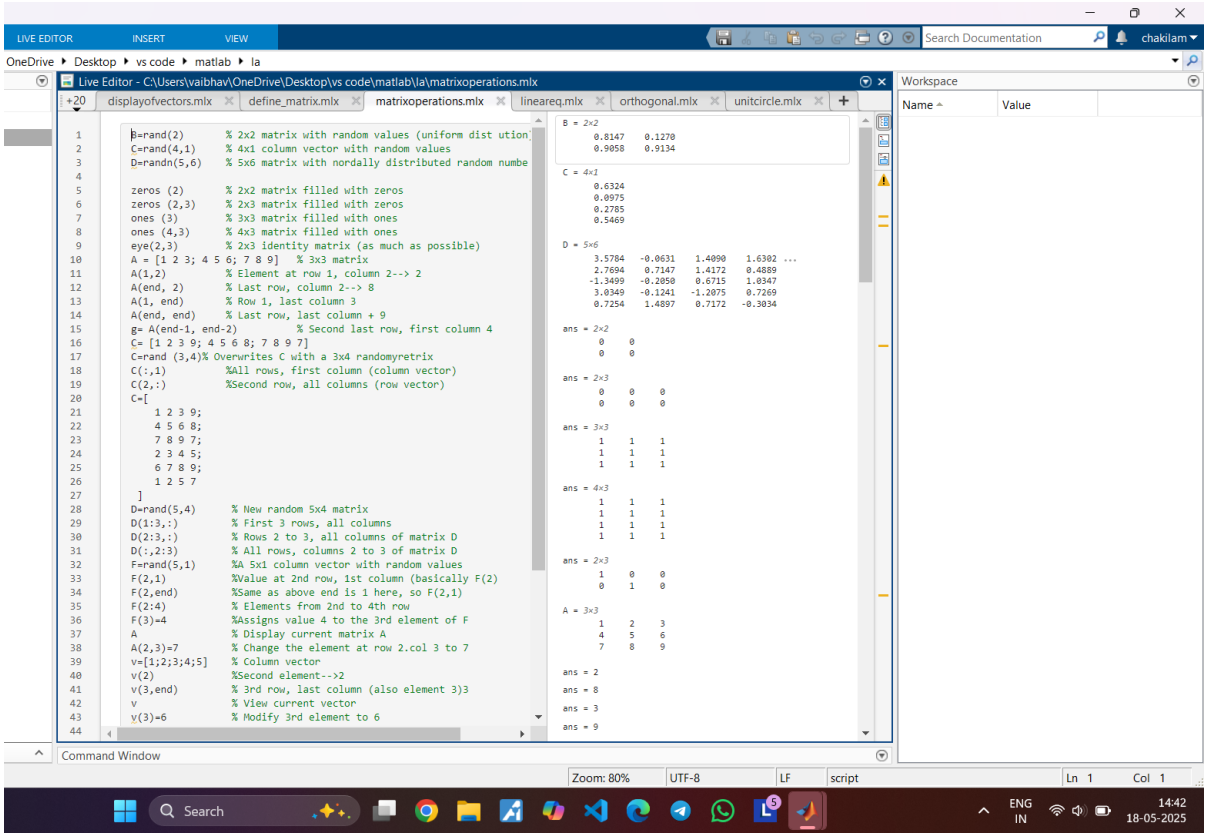
1. Write a MATLAB code to define and display vectors.

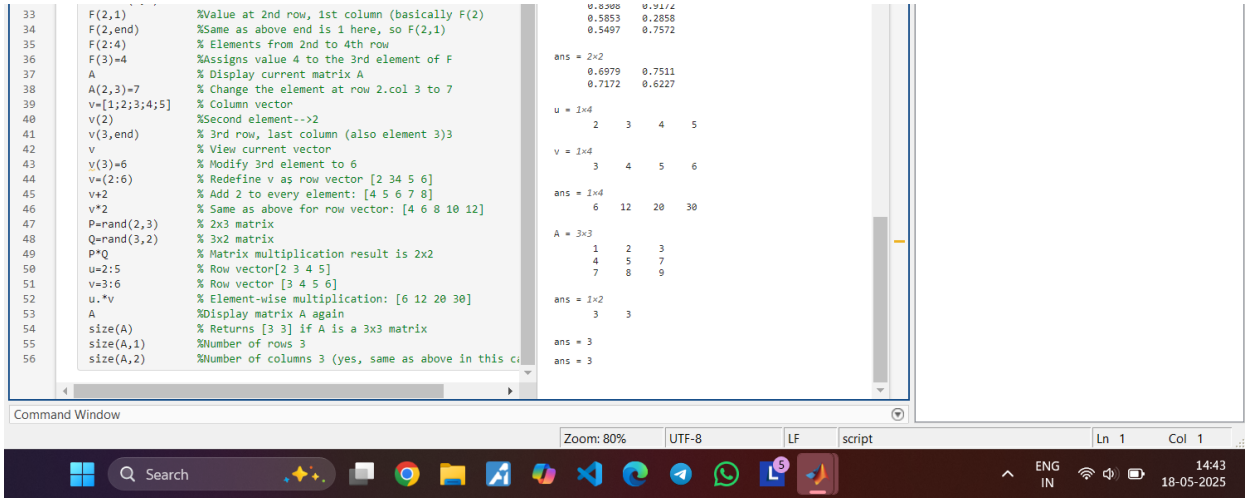


2. Write a MATLAB code to define and display matrix.

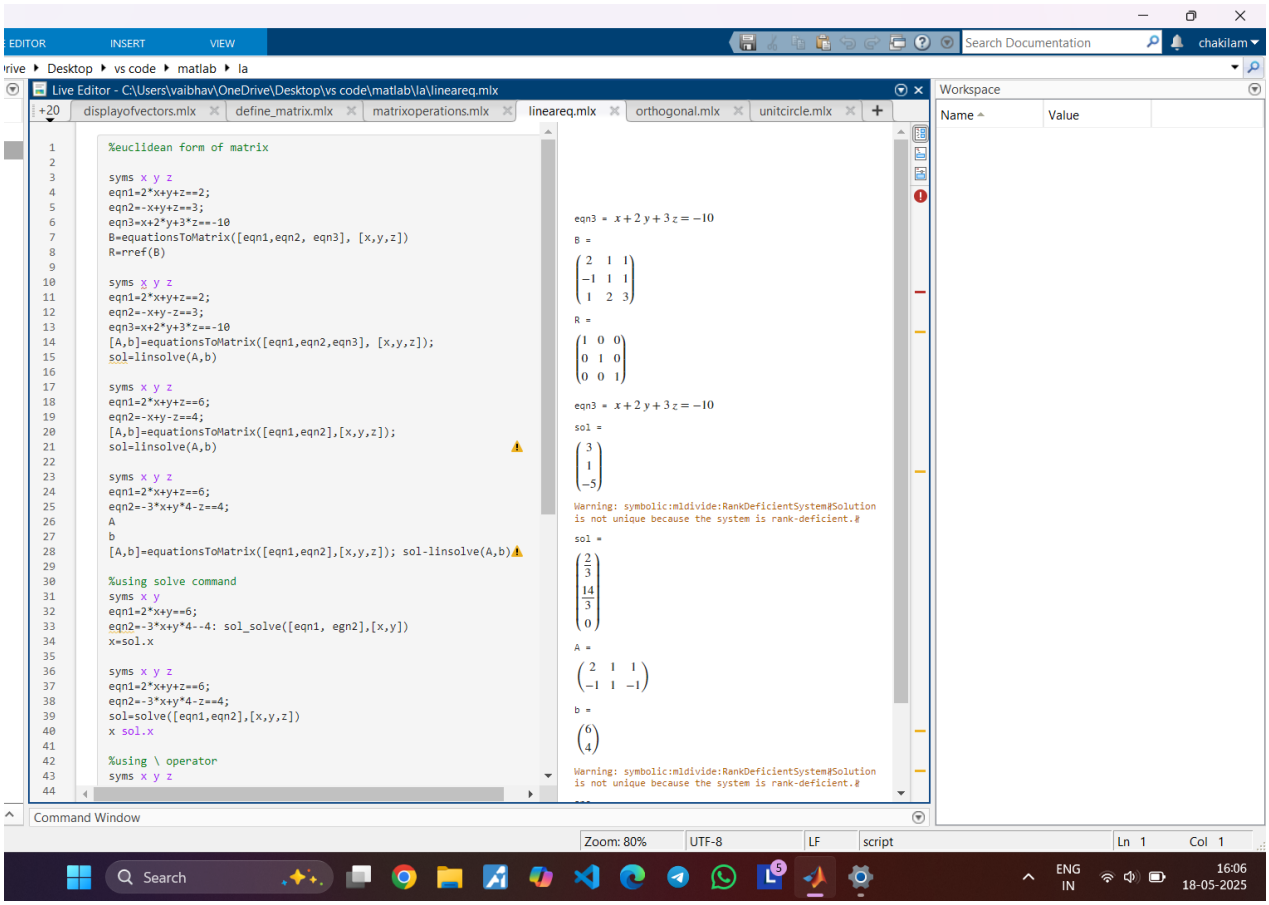


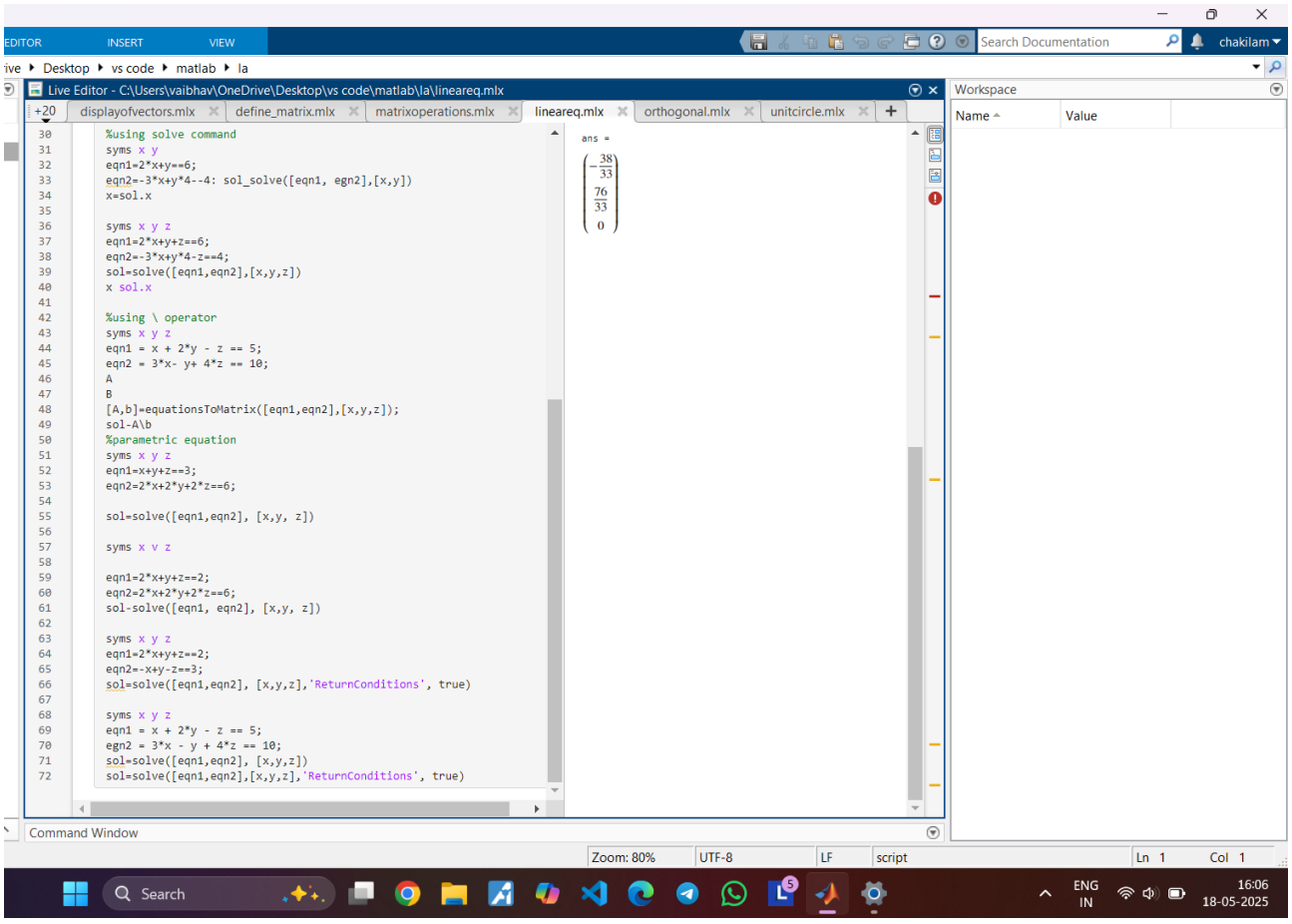
3. Write a MATLAB code to define and display a random matrix and their operations.



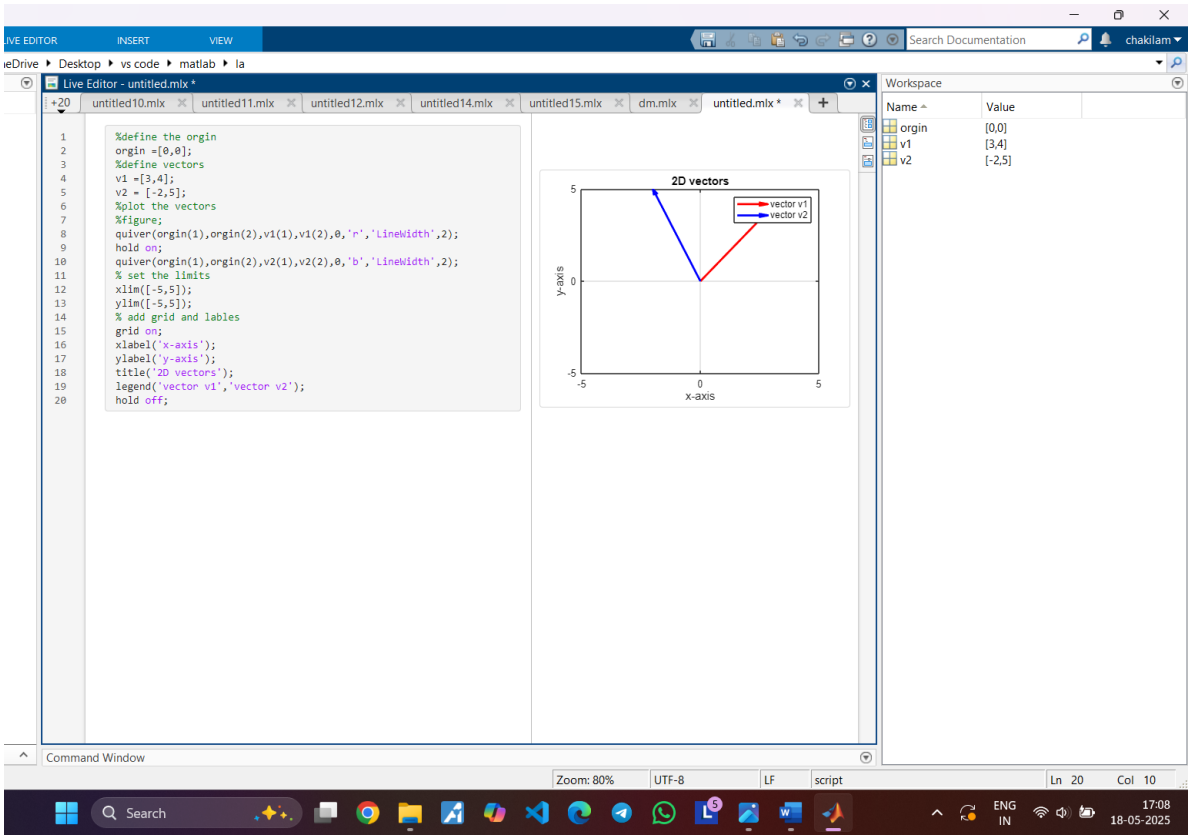


4. Write a MATLAB code to find the solutions of given linear system of equations.

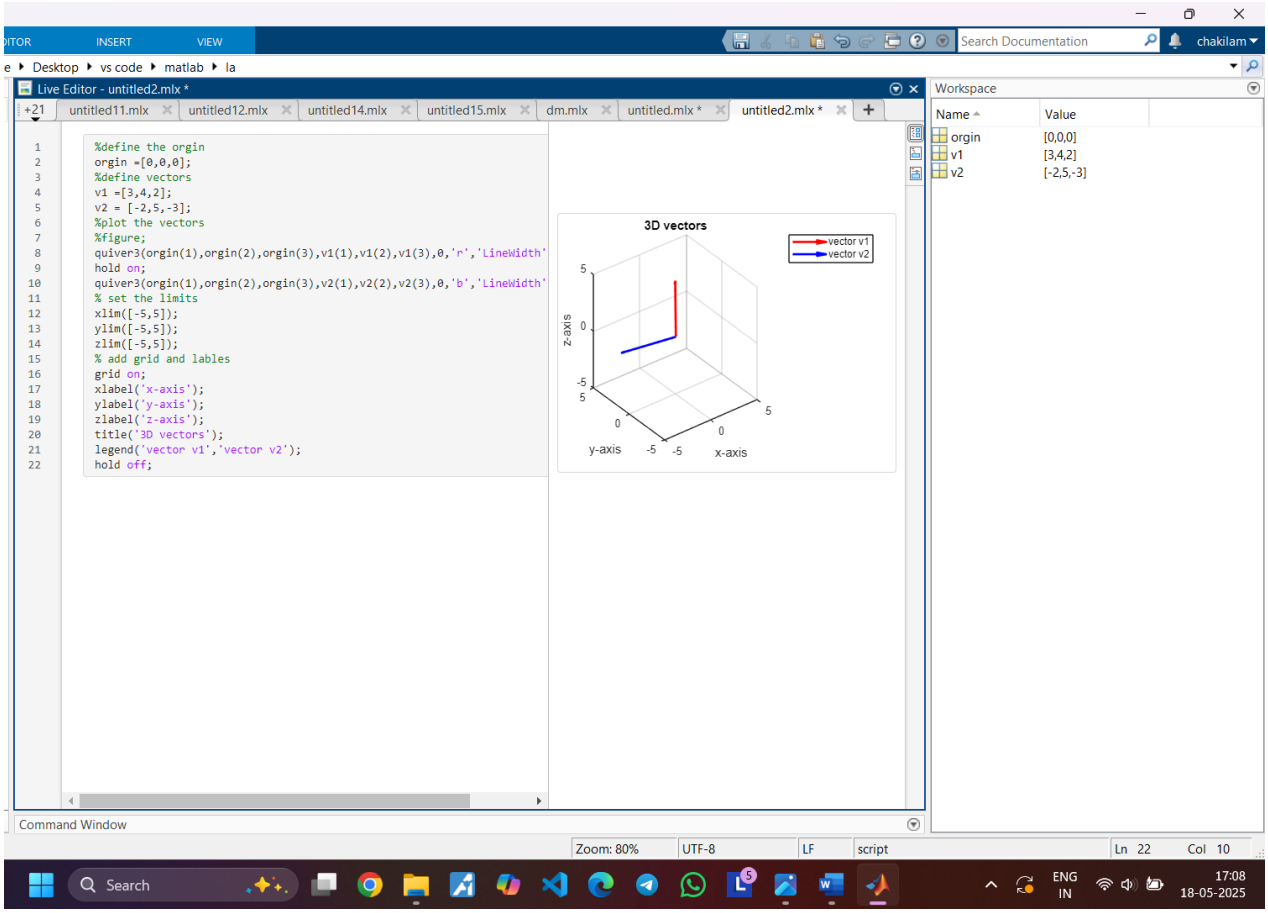




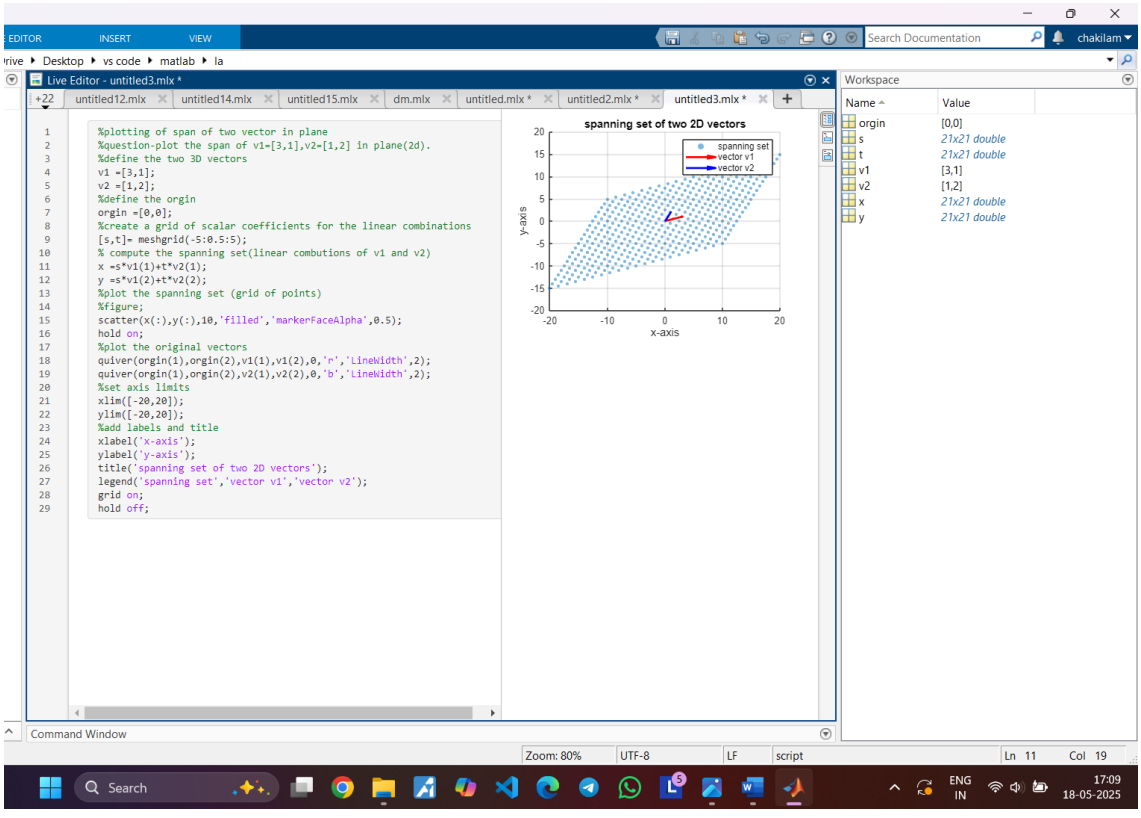
5. Write a MATLAB code to draw the vectors (3,4) and(-2,5) in a 2-D plane.



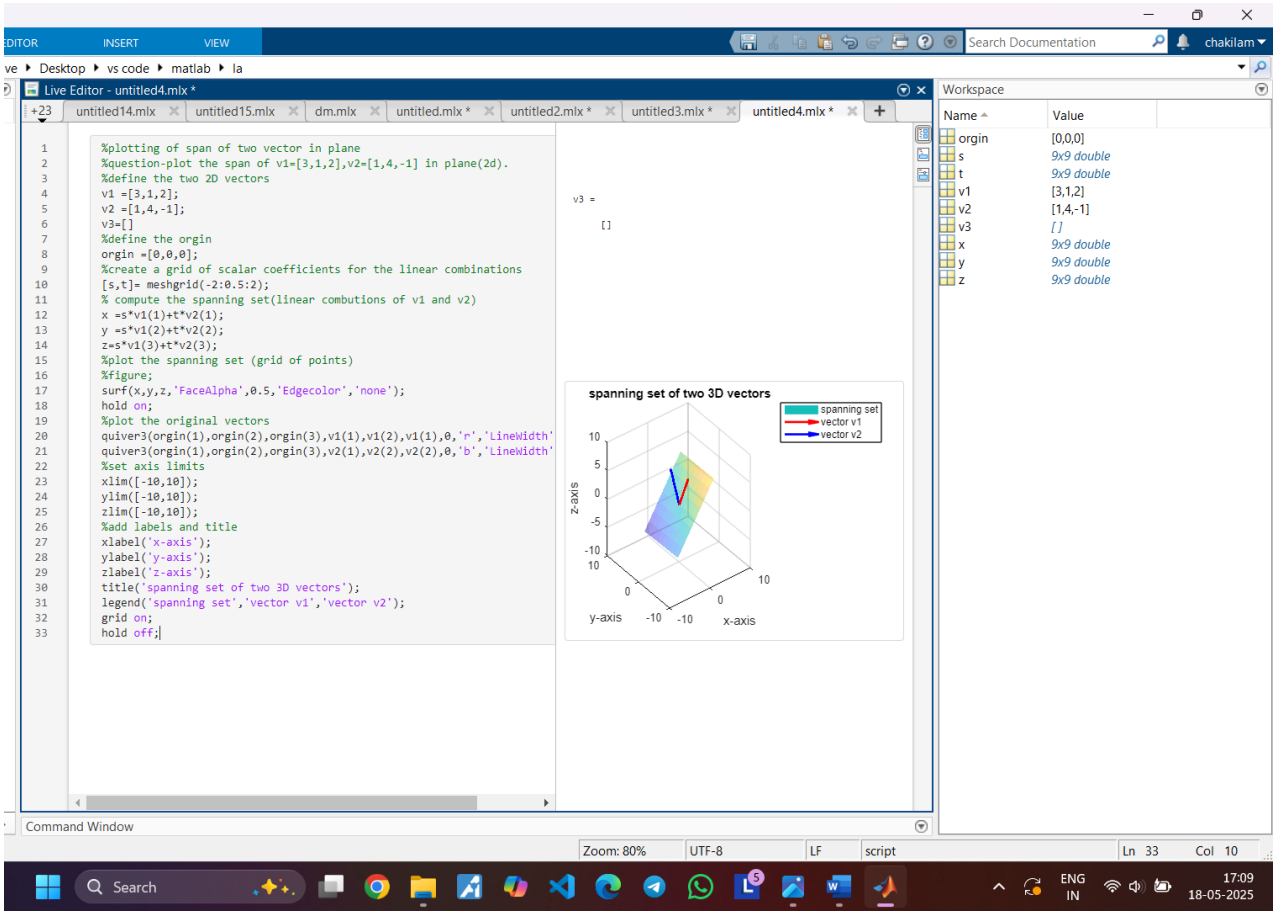
6. Write a MATLAB code to draw the vectors (3,4,0) and(-2,5,0) in a 3-D plane.



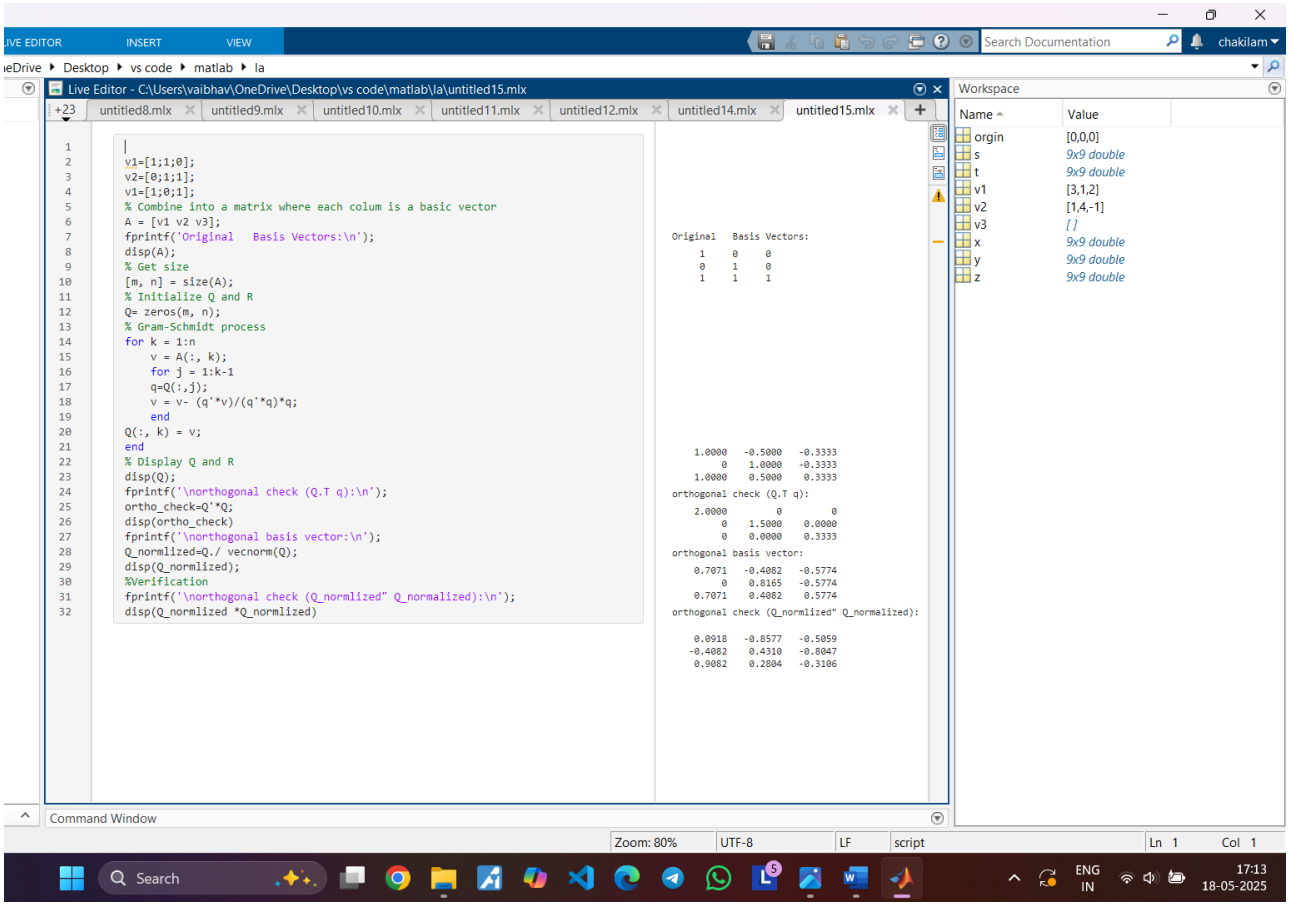
7. Using MATLAB, define the vectors v1 = [3, 1] and v2 = [1, 2]. Write a program to visualize their span in 2D space.



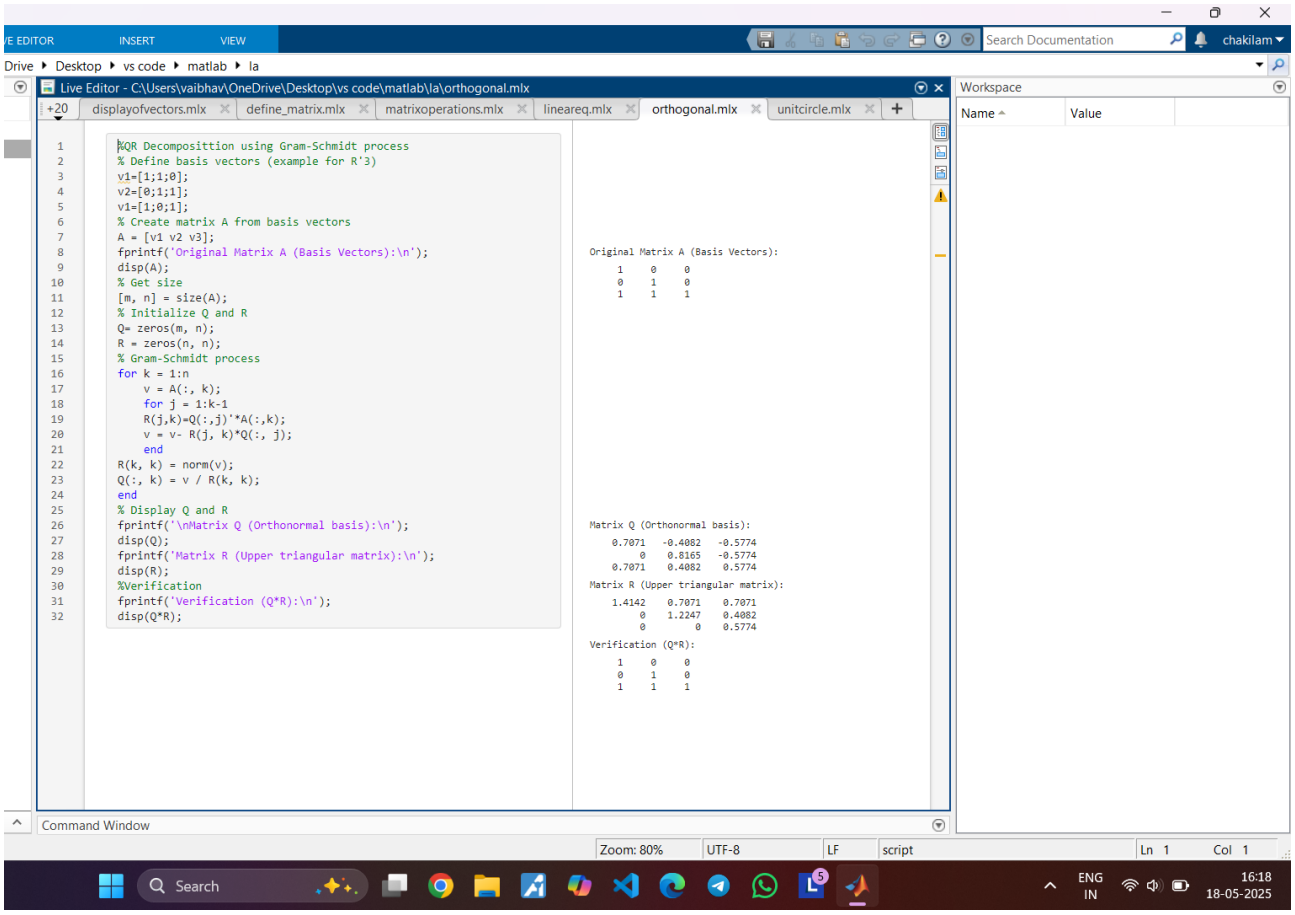
8. Using MATLAB, define the vectors v1=(3,1,2) and v2=(1,4,-1). Write a program to visualize their span in 3D space.



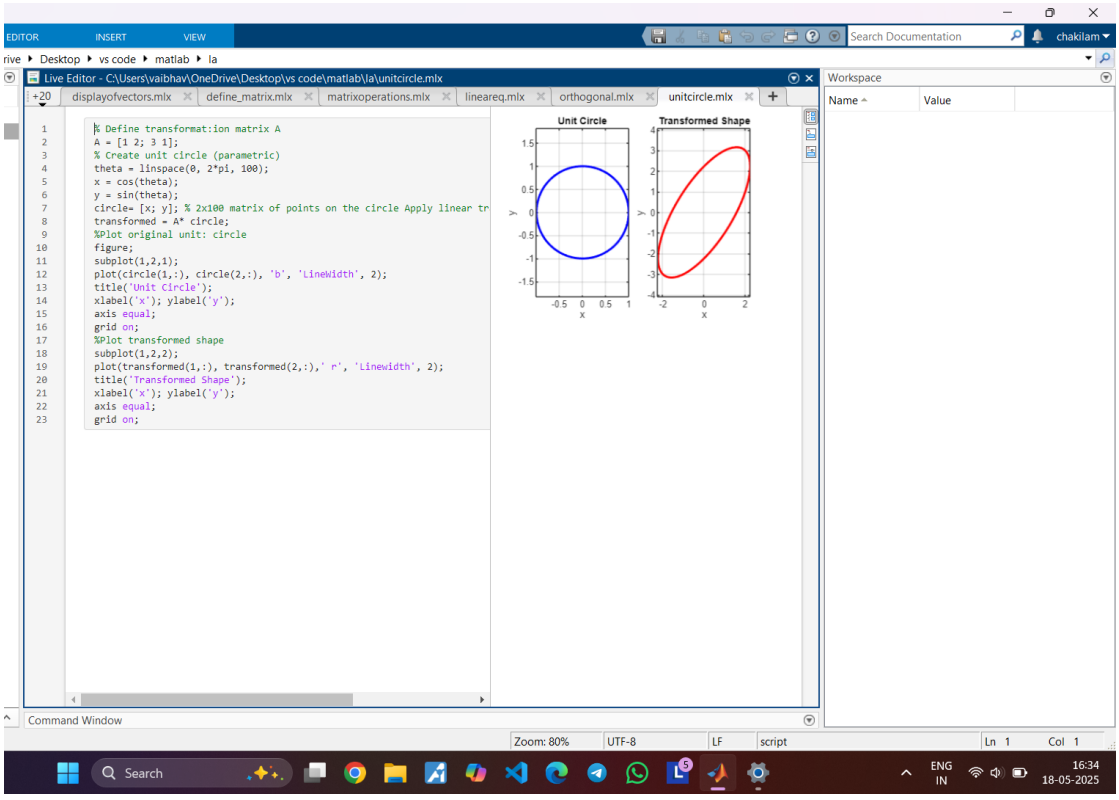
9. Using MATLAB, for any given positive integer and for any given basis for R^n. write a program to find the orthonormal basis corresponding to the given basis.

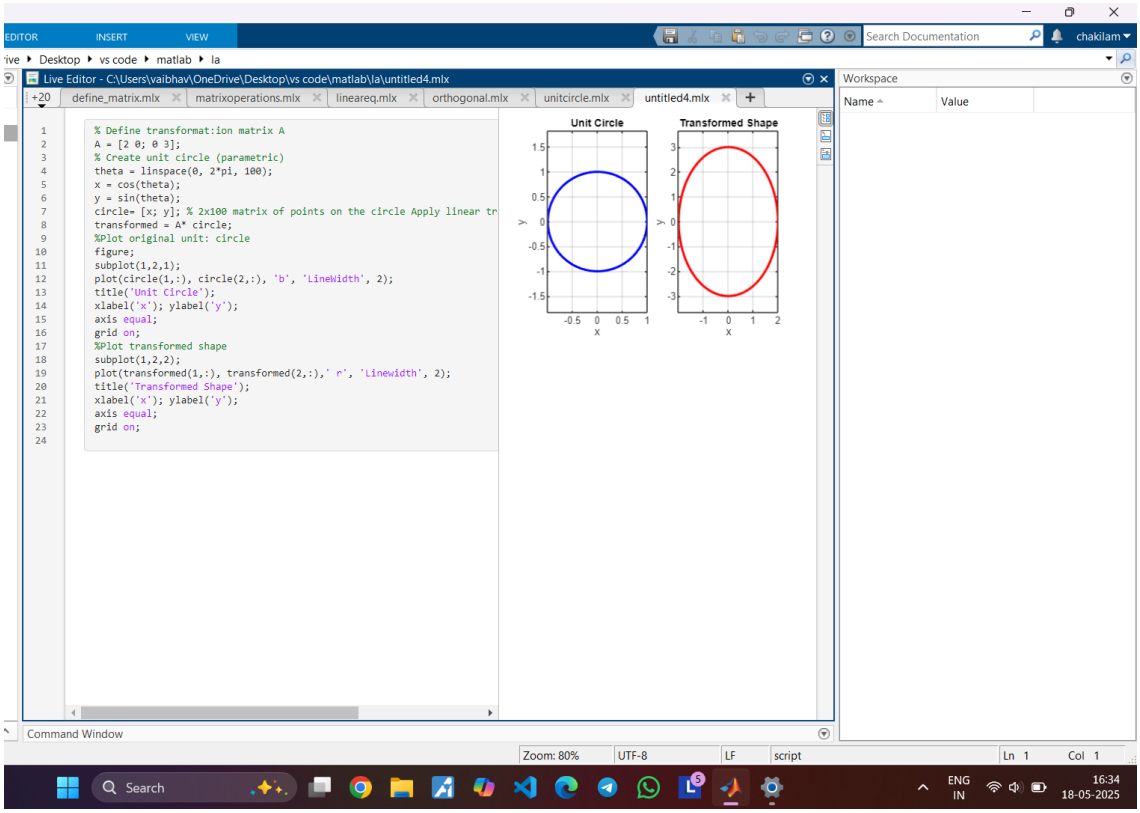


10. Using MATLAB, write a program to find the QR decomposition corresponding to the give



11. Using MATLAB, write a program to Visualize how a matrix transforms the unit circle.

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define_matrix.mlx
matrixoperations.mlx
lineareq.mlx
orthogonal.mlx
unitcircle.mlx
untitled4.mlx
% Define transformat:ion matrix A
A = [2 0; 0 3];
% Create unit circle (parametric)
theta = linspace(0, 2*pi, 100);
x = cos(theta);
y = sin(theta);
circle= [x; y]; % 2x100 matrix of points on the circle Apply linear tr
transformed = A* circle;
%Plot original unit: circle
figure;
subplot(1,2,1);
plot(circle(1,:), circle(2,:), 'b', 'LineWidth', 2);
title('Unit Circle');
xlabel('x'); ylabel('y');
axis equal;
grid on;
%Plot transformed shape
subplot(1,2,2);
plot(transformed(1,:), transformed(2,:),' r', 'Linewidth', 2);
title('Transformed Shape');
xlabel('x'); ylabel('y');
axis equal;
grid on;
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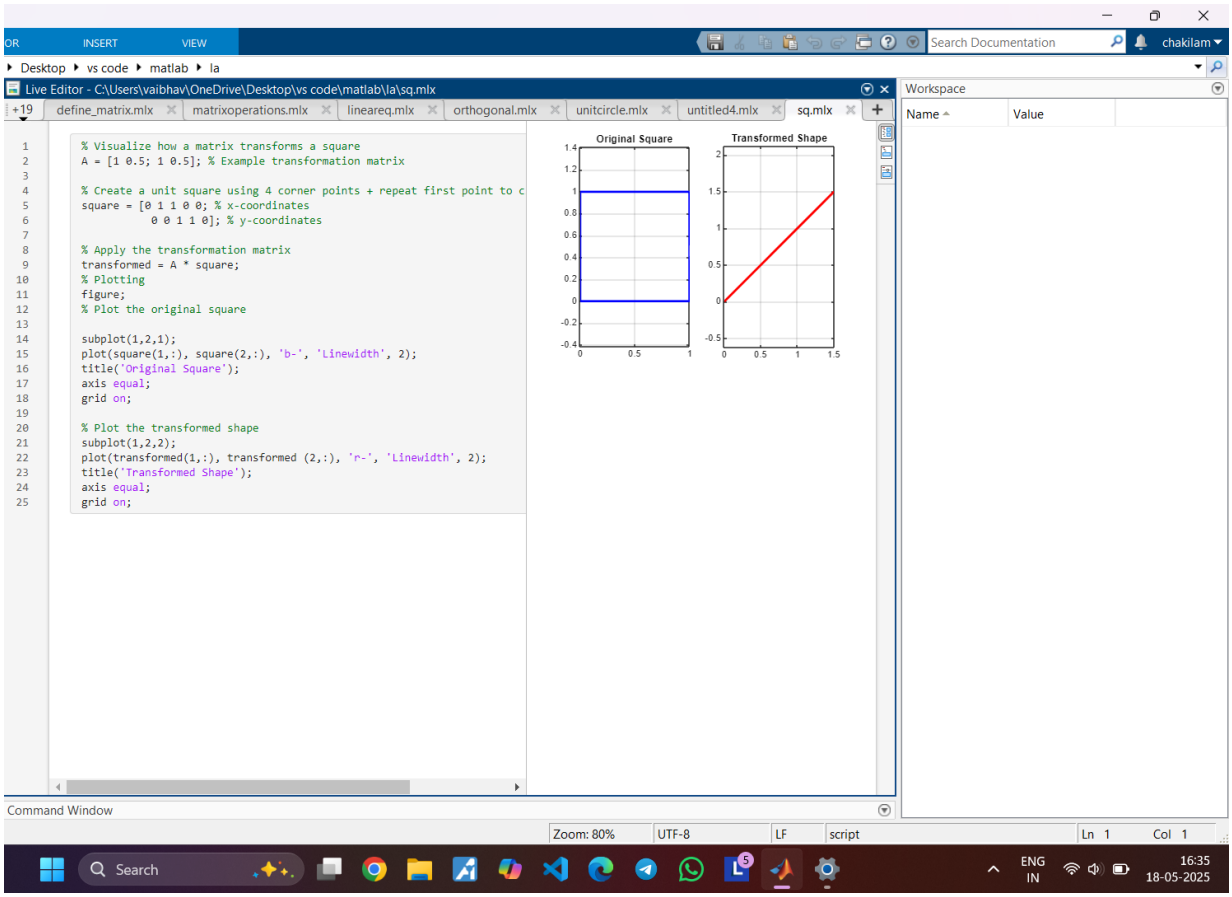
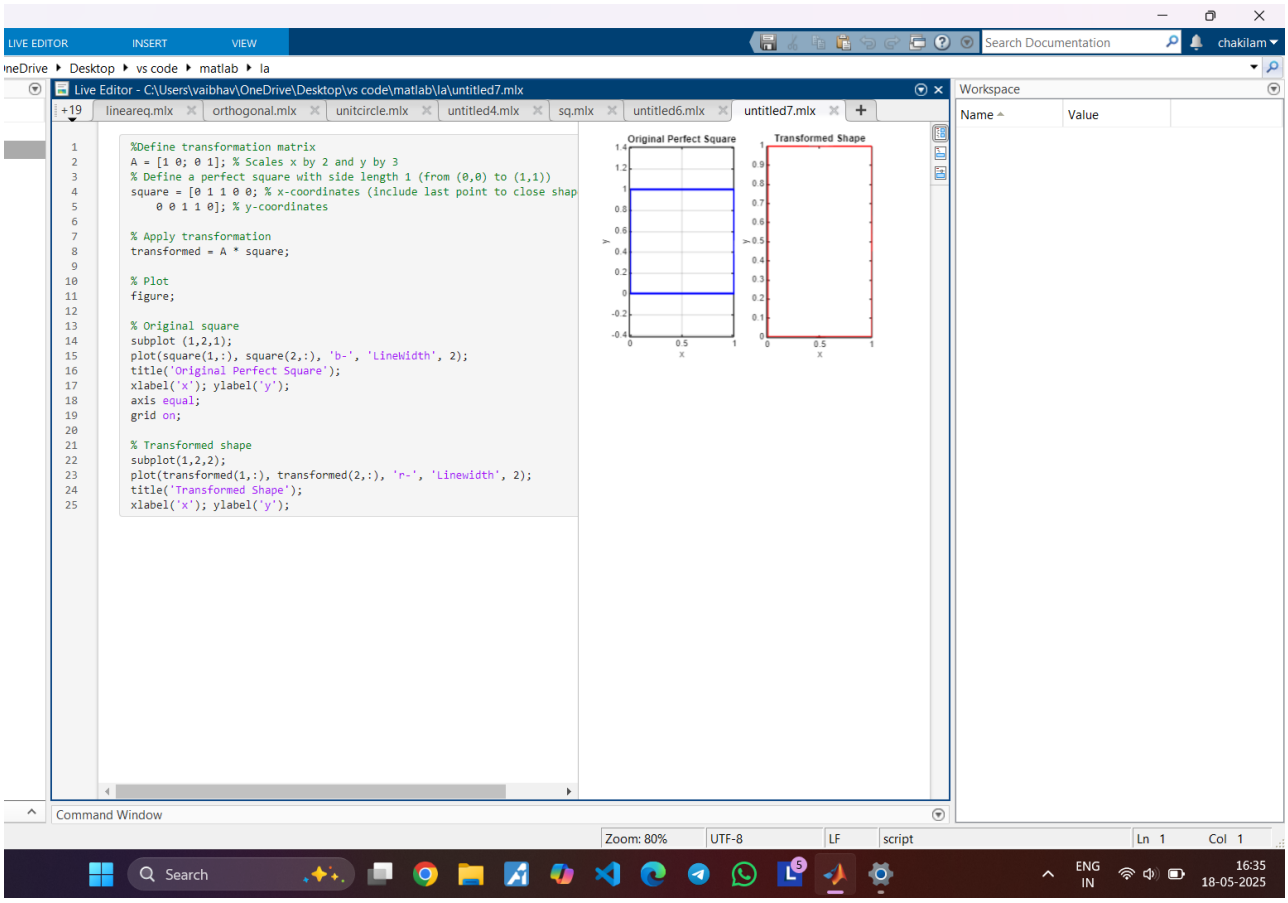
12. Using MATLAB, write a program to Visualize how a matrix transforms a square.

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orthogonal.mlx
unitcircle.mlx
untitled4.mlx
sq.mlx
untitled6.mlx
untitled7.mlx
%Define transformation matrix
A = [1 0; 0 1]; % Scales x by 2 and y by 3
% Define a perfect square with side length 1 (from (0,0) to (1,1))
square = [0 1 1 0 0; % x-coordinates (include last point to close shap
0 0 1 1 0]; % y-coordinates
% Apply transformation
transformed = A * square;
% Plot
figure;
% Original square
subplot (1,2,1);
plot(square(1,:), square(2,:), 'b-', 'LineWidth', 2);
title('Original Perfect Square');
xlabel('x'); ylabel('y');
axis equal;
grid on;
% Transformed shape
subplot(1,2,2);
plot(transformed(1,:), transformed(2,:), 'r-', 'Linewidth', 2);
title('Transformed Shape');
xlabel('x'); ylabel('y');
Original Perfect Square
Transformed Shape
Workspace
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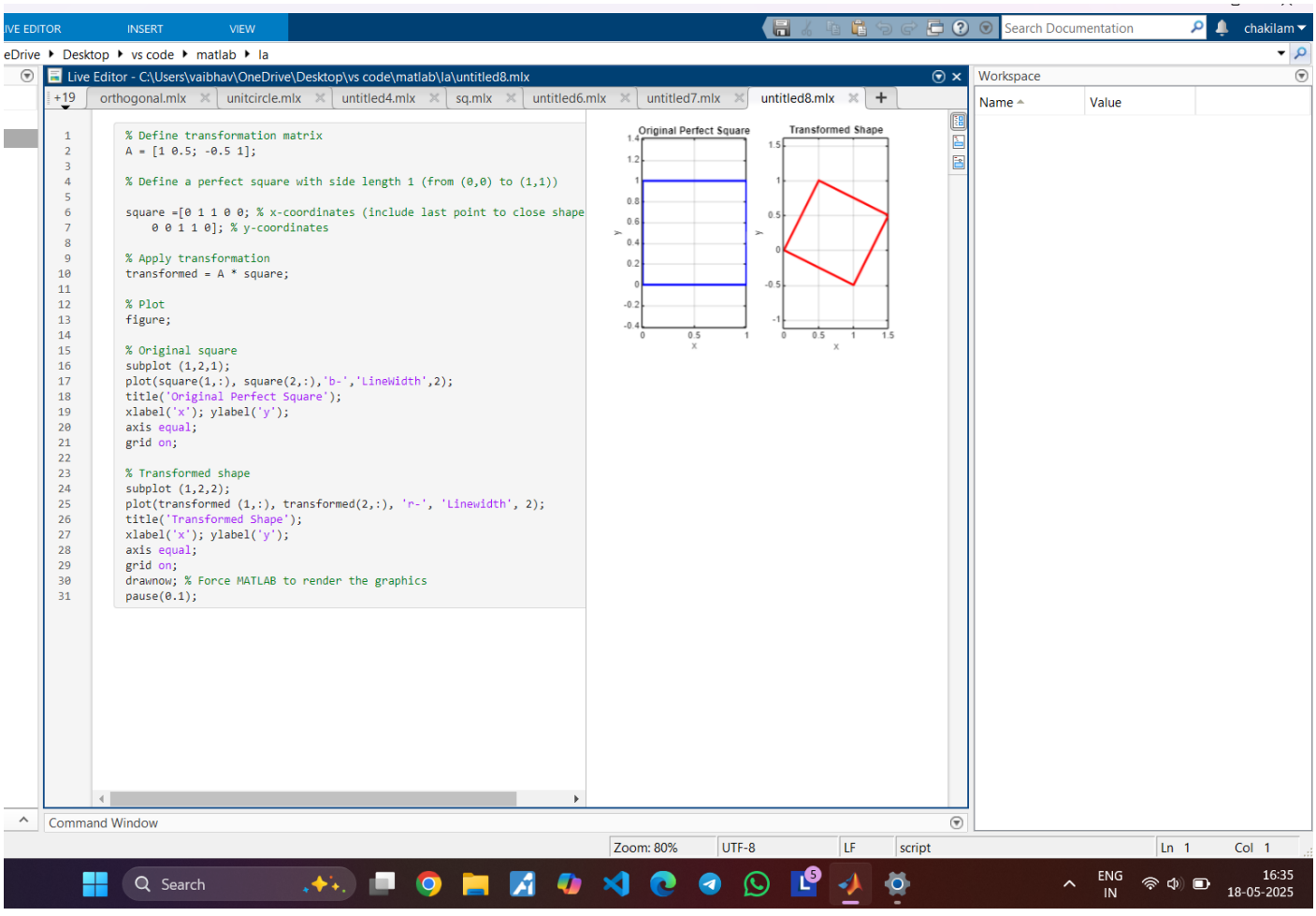
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orthogonal.mlx
unitcircle.mlx
untitled4.mlx
sq.mlx
untitled6.mlx
untitled7.mlx
untitled8.mlx
% Define transformation matrix
A = [1 0.5; -0.5 1];
% Define a perfect square with side length 1 (from (0,0) to (1,1))
square =[0 1 1 0 0; % x-coordinates (include last point to close shape
0 0 1 1 0]; % y-coordinates
% Apply transformation
transformed = A * square;
% Plot
figure;
% Original square
subplot (1,2,1);
plot(square(1,:), square(2,:),'b-','LineWidth',2);
title('Original Perfect Square');
xlabel('x'); ylabel('y');
axis equal;
grid on;
% Transformed shape
subplot (1,2,2);
plot(transformed (1,:), transformed(2,:), 'r-', 'Linewidth', 2);
title('Transformed Shape');
xlabel('x'); ylabel('y');
axis equal;
grid on;
drawnow; % Force MATLAB to render the graphics
pause(0.1);
Original Perfect Square
Transformed Shape
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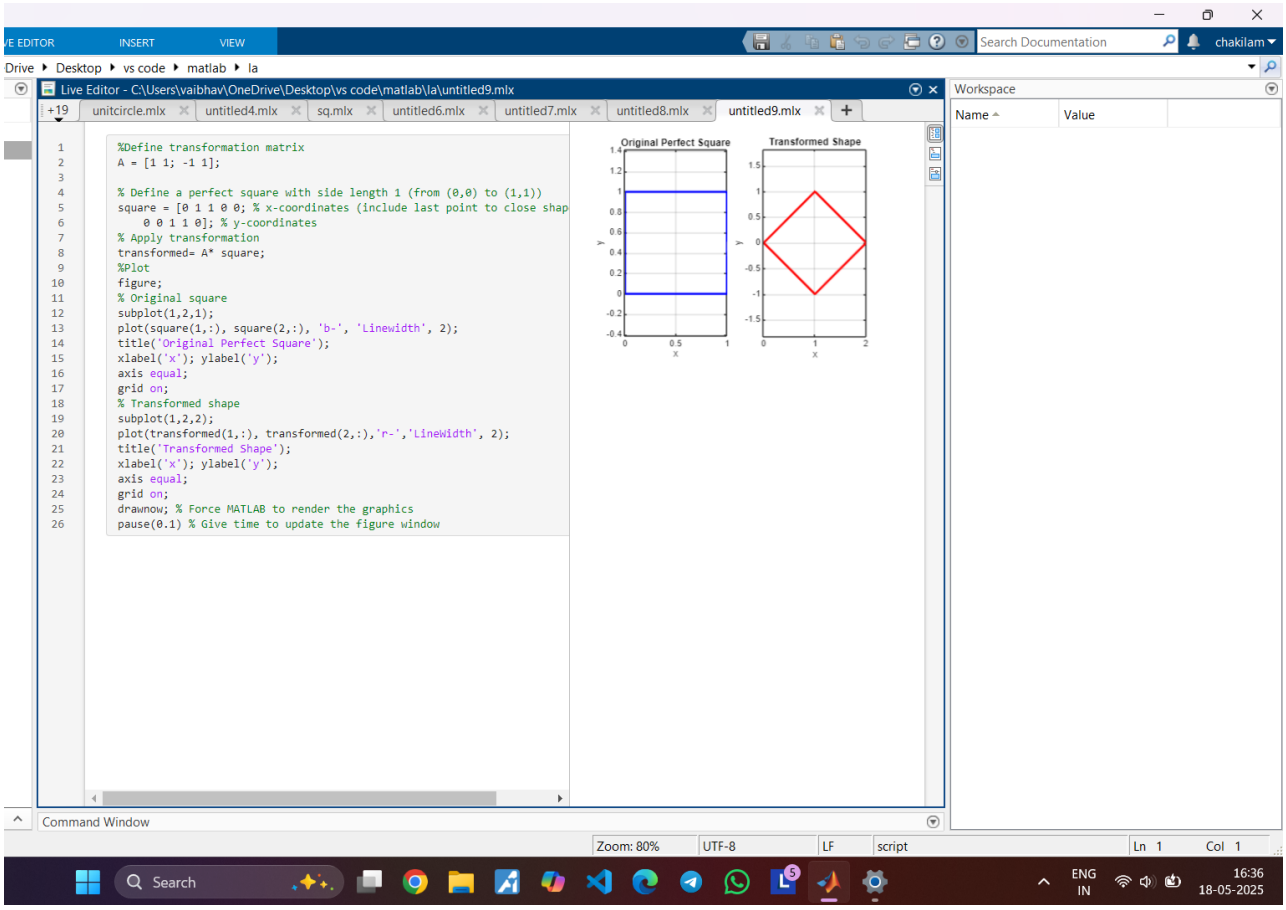
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unitcircle.mlx
untitled4.mlx
sq.mlx
untitled6.mlx
untitled7.mlx
untitled8.mlx
untitled9.mlx
%Define transformation matrix
A = [1 1; -1 1];
% Define a perfect square with side length 1 (from (0,0) to (1,1))
square = [0 1 1 0 0; % x-coordinates (include last point to close shap
0 0 1 1 0]; % y-coordinates
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title('Transformed Shape');
xlabel('x'); ylabel('y');
axis equal;
grid on;
drawnow; % Force MATLAB to render the graphics
pause(0.1) % Give time to update the figure window
Original Perfect Square
Transformed Shape
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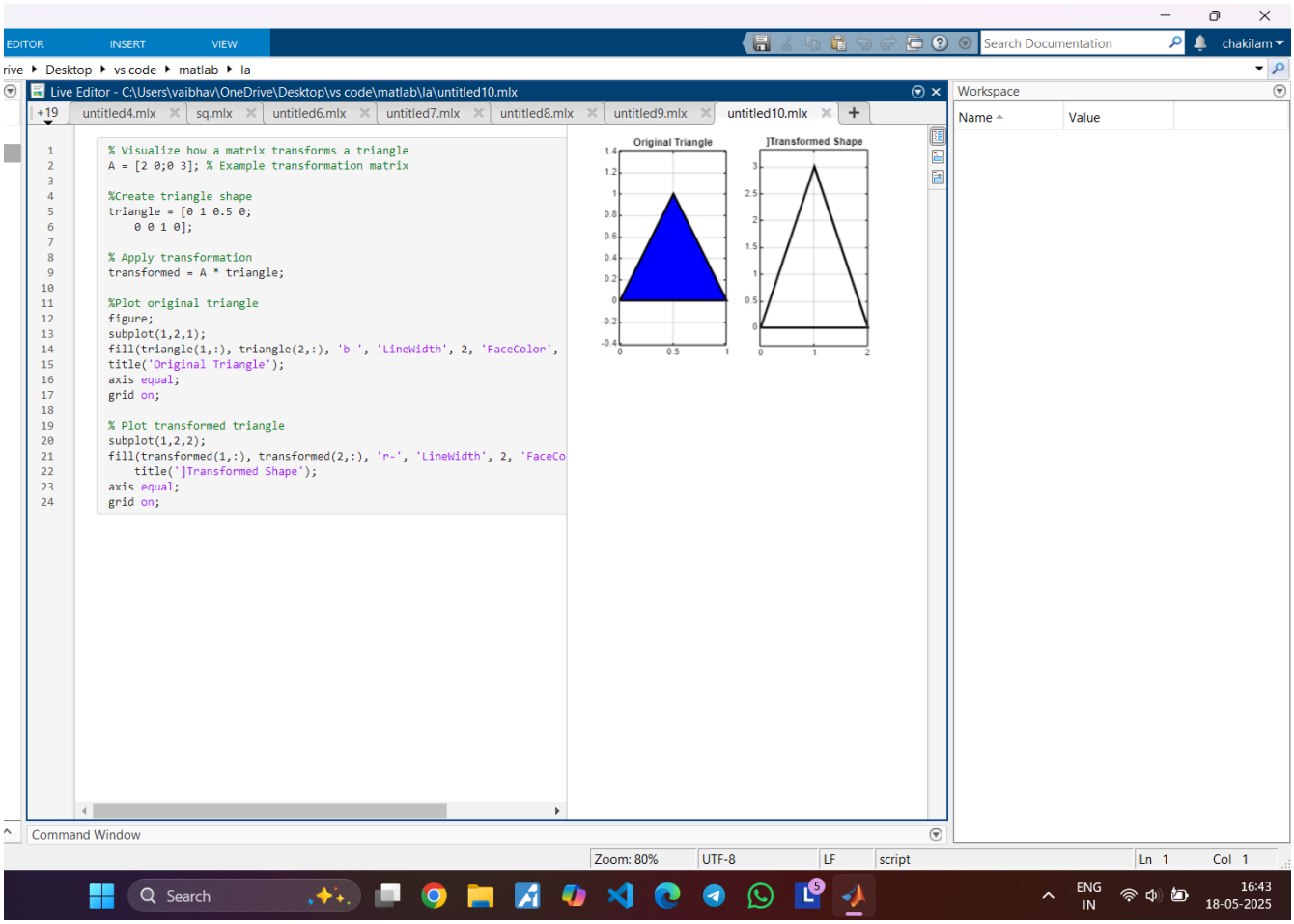
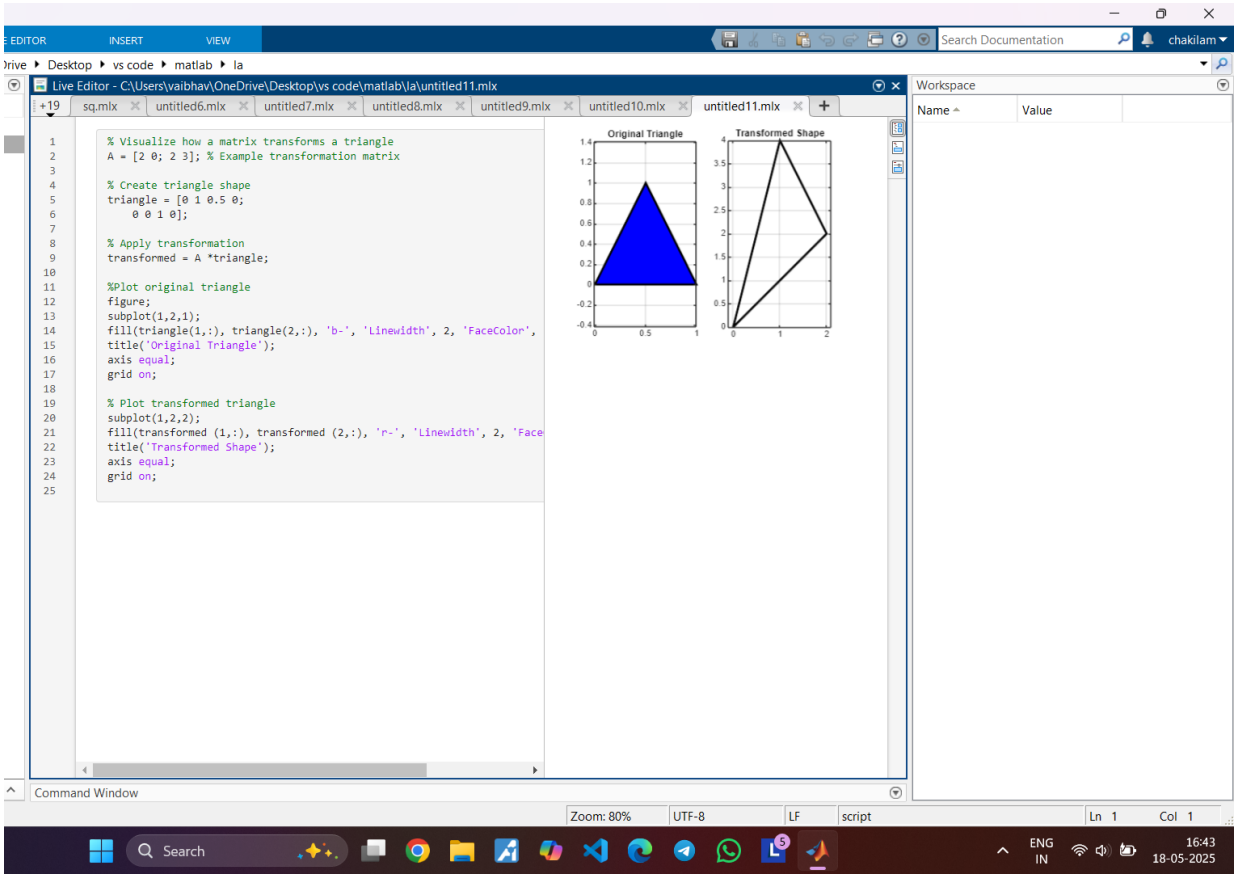
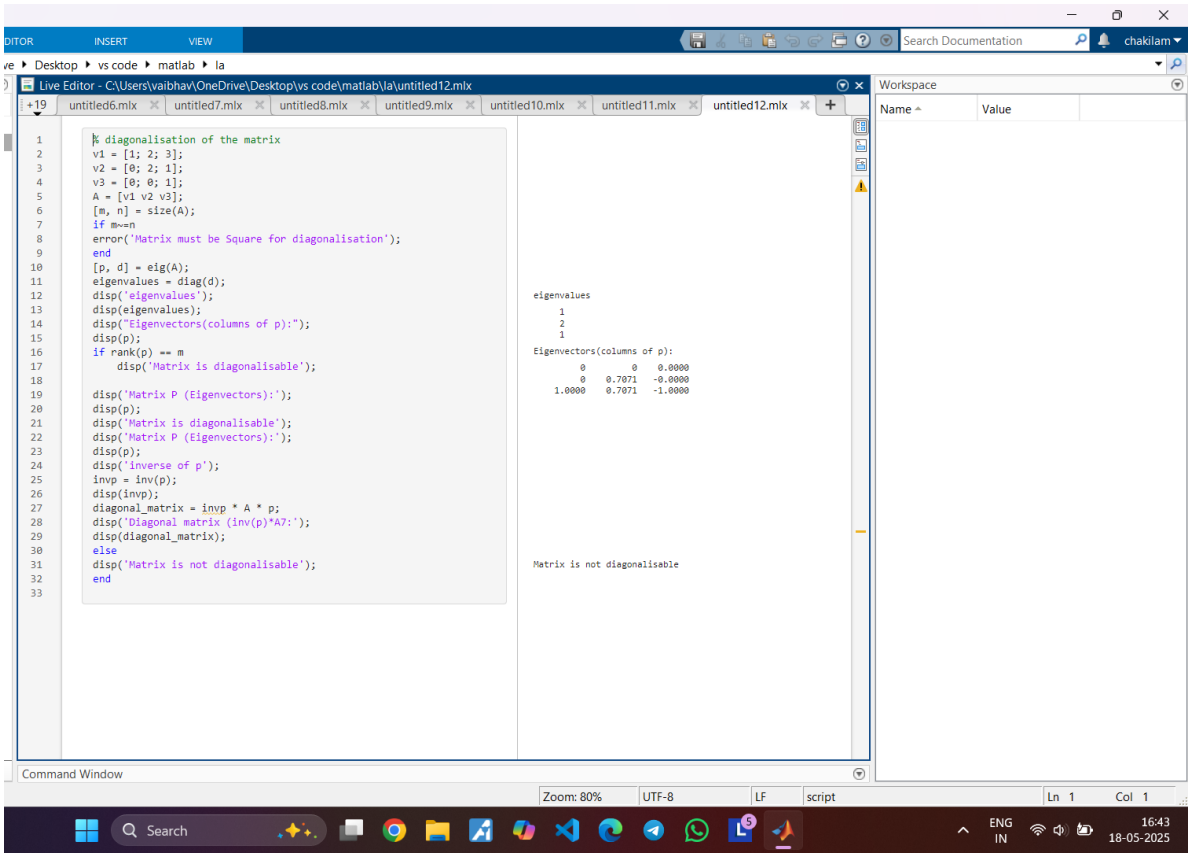
13. Using MATLAB, write a program to Visualize how a matrix transforms a triangle.





14. Using MATLAB, write a program to find diagonalisation of the matrix.



15. Using MATLAB, write a program to find orthogonal diagonalisation of a given matrix.