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% Zyad Khan
% Matlab Unit 2 Assignment
% MATH-210: Linear Algebra

% Display name and assignment details
disp('Zyad Khan - MATLAB Unit 2 Assignment')

% Clear the grid
clf

% Code for the random colors
col_list='rgbcmykw';
col=randi([1,8],1);
color_choice=randi([1,8],1);

% First 2D Shape - Trapezoid
trapezoid = [0 0 0.5 1 ; 0 0.5 0.5 0 ; 1 1 1 1];
patch(trapezoid(1,:), trapezoid(2,:), col_list(randi([1,8],1)));

% Transformation 1: Rotation by pi/6
transformation_1 = [cos(pi/6), -sin(pi/6) 0; sin(pi/6), cos(pi/6), 0 ;
0 0 1];
p_transformation1 = transformation_1* trapezoid;

%For loop to apply the first transformation to the first
transformation of
%the trapezoid 20 times to create the pattern
for c = 1:10
    p_transformation1 = transformation_1*p_transformation1;
    patch(p_transformation1(1,:), p_transformation1(2,:),
col_list(randi([1,8],1)))
end

%Second 2D Shape - Parallelogram
parallelogram = [1 1.2 1.4 1.2 ; 1 1 0 0 ; 1 1 1 1];

% Transformation 5: Shift down 1/8
transformation_5 = [ 1 0 0 ; 0 1 -1/2 ; 0 0 1];
p_transformation1 = transformation_5* parallelogram;

% Set axis
axis([-3,3,-3,3])
p_transformation1 = transformation_1*p_transformation1;

%For loop to apply the first transformation to the first
transformation of
% the second shape (Parallelogram)
for c = 1:12

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        p_transformation1 = transformation_1*p_transformation1;
        patch(p_transformation1(1,:), p_transformation1(2,:),
        col_list(randi([1,8],1)))
    end

%Third 2D Shape - Triangle
triangle = [ 3 2 0 ; 0 2 3 ; 1 1 1];

% Transformation 2: Reflection through the line  $x_2 = -x_1$ 
transformation_2 = [0 -1 0 ; -1 0 0 ; 0 0 1];

% Transformation 3: Reflection through  $x_1$  axis
transformation_3 = [ 1 0 0 ; 0 -1 0 ; 1 1 1 ];

% Transformation 4: Reflection through  $x_2$  axis
transformation_4 = [-1 0 0 ; 0 1 0 ; 0 0 1];

% Transformation 6: Shift down  $1/5$ 
transformation_6 = [ 1 0 0 ; 0 1 -1/5 ; 0 0 1];

% Transformation 7: Shift up  $1/5$ 
transformation_7 = [ 1 0 0 ; 0 1 1/5 ; 0 0 1];

% Triangle 1 (Bottom Right)
t_transformation = transformation_3*triangle;
t_transformation = transformation_2*t_transformation;
t_shift = transformation_7 * t_transformation;
patch(t_shift(1,:), t_shift(2,:), col_list(randi([1,8],1)))

% Triangle 2 (Bottom Left)
t_transformation = transformation_4*t_transformation;
t_shift = transformation_7 * t_transformation;
patch(t_shift(1,:), t_shift(2,:), col_list(randi([1,8],1)))

% Triangle 3 (Top Right)
t_transformation = transformation_2*t_transformation;
t_shift = transformation_6 * t_transformation;
patch(t_shift(1,:), t_shift(2,:), col_list(randi([1,8],1)))

% Triangle 4 (Top Left)
t_transformation = transformation_4*t_transformation;
t_shift = transformation_6 * t_transformation;
patch(t_shift(1,:), t_shift(2,:), col_list(randi([1,8],1)))

% Set background color

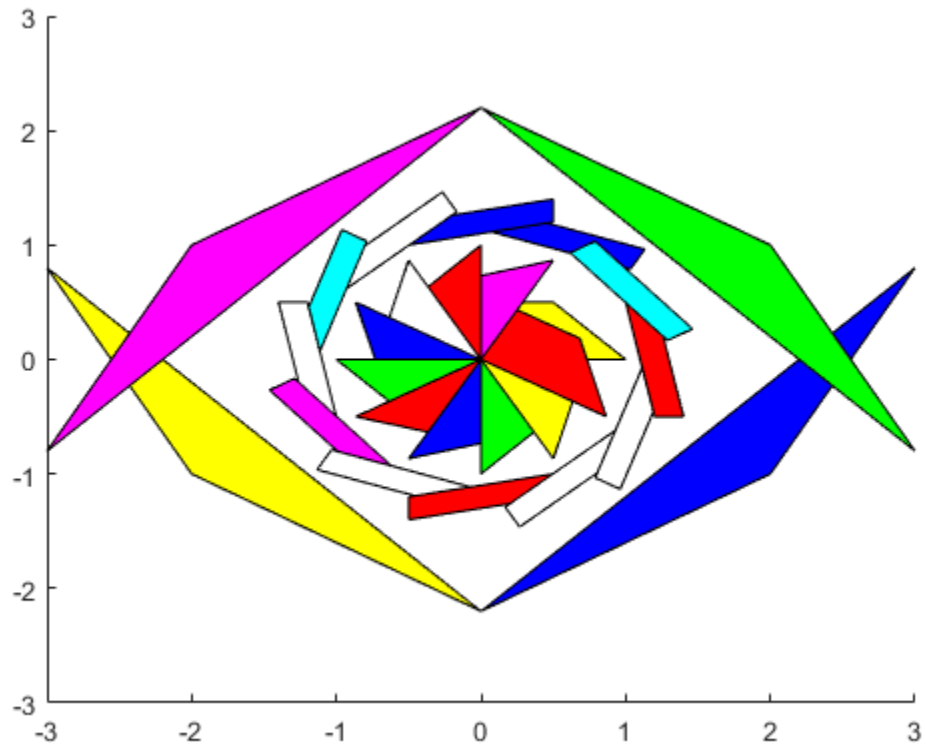
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set(gca,'color',[0.3010 0.7450 0.9330]);
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*Zyad Khan - MATLAB Unit 2 Assignment*



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