Lab4 - Nikola Uzelac MAT343

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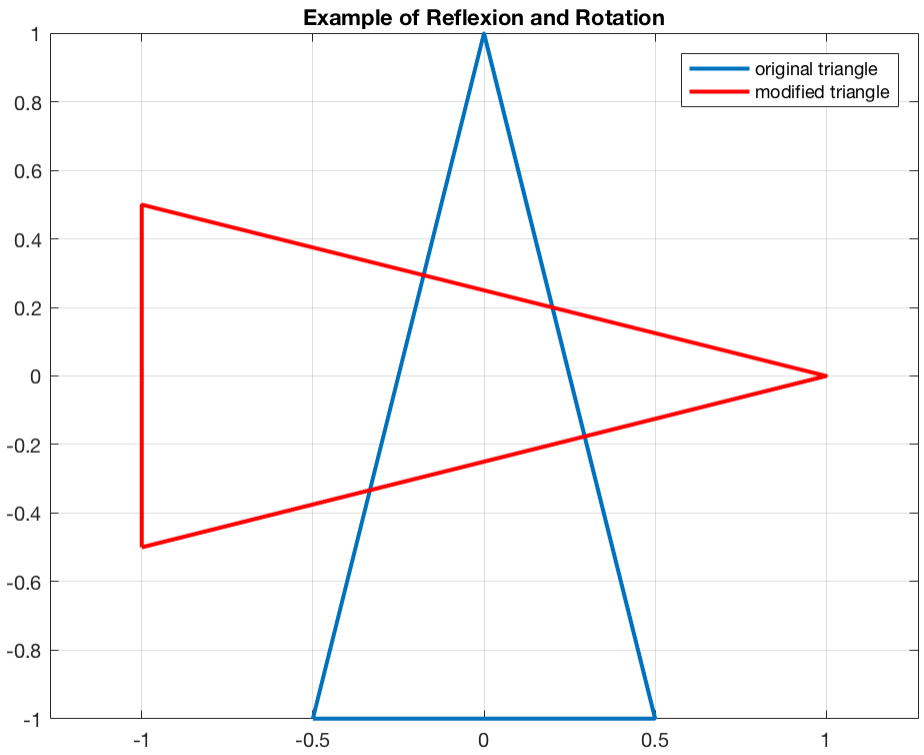
MAT 343 MATLAB Assignment # 4

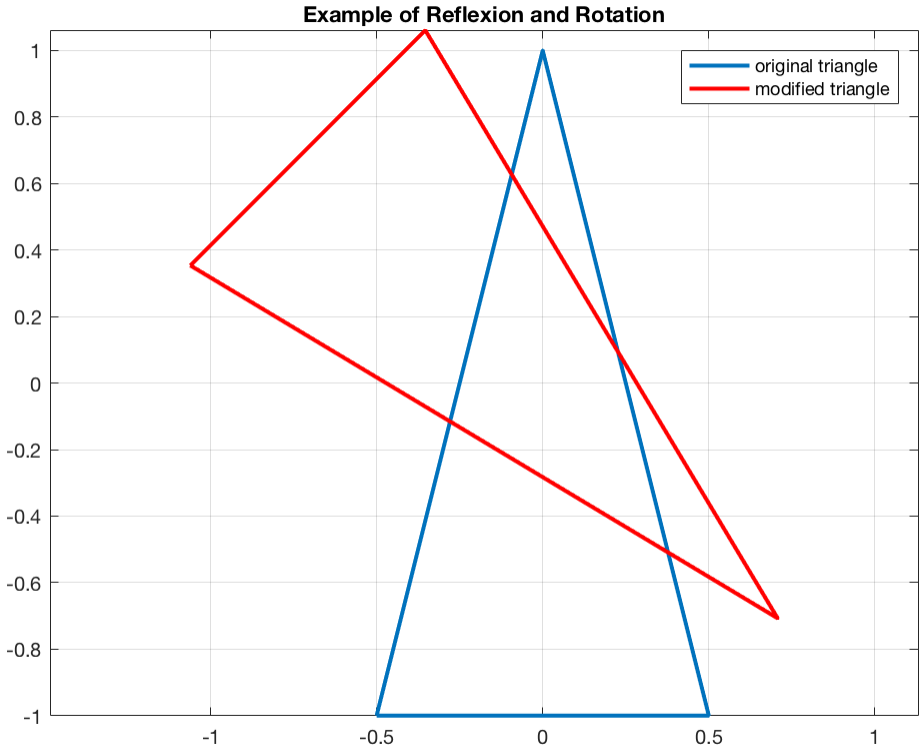
Excercise # 1

```
clf
T =[-0.5,0,0.5,-0.5;-1,1,-1,-1];
plot(T(1,:),T(2,:),'linewidth',2)
hold on
R = [0,1;1,0];
QRT = R*T;
plot(QRT(1,:),QRT(2,:),'-r','linewidth',2)
title('Example of Reflexion and Rotation')
legend('original triangle','modified triangle')
grid on
axis equal
hold off
```



Excercise # 2

```
clf
T =[-0.5,0,0.5,-0.5;-1,1,-1,-1];
plot(T(1,:),T(2,:),'linewidth',2)
hold on
Q = [cos(pi/4), -sin(pi/4); sin(pi/4), cos(pi/4)];
R = [0,1;1,0];
RQT = R*Q*T;
plot(RQT(1,:),RQT(2,:),'-r','linewidth',2)
title('Example of Reflexion and Rotation')
legend('original triangle','modified triangle')
grid on
axis equal
hold off
```

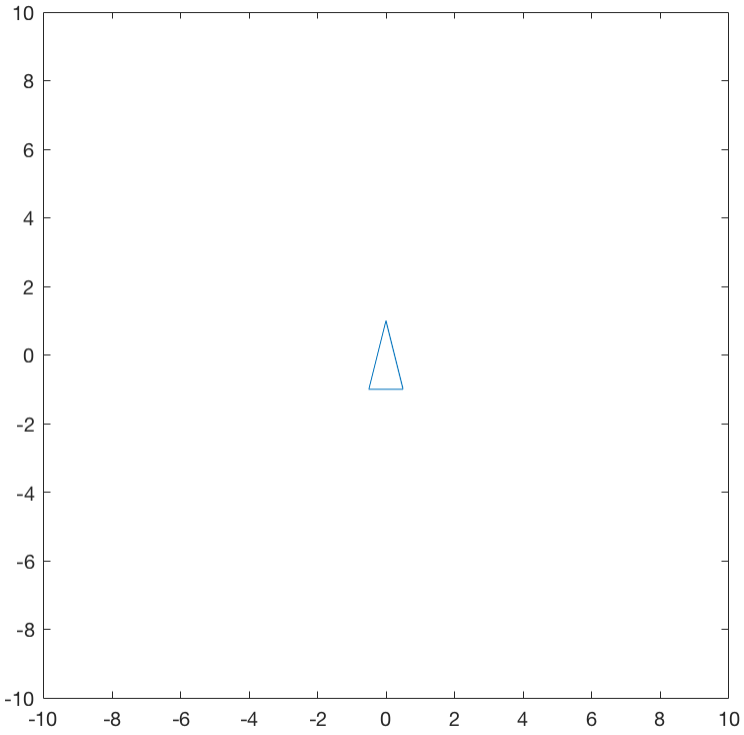


Excercise 3

```
clf                                     %clear all settings for the
 plot
Q = [cos(pi/20), -sin(pi/20); sin(pi/20), cos(pi/20)]
W = [cos(-pi/20), -sin(-pi/20); sin(-pi/20), cos(-pi/20)]
T = [-0.5,0,0.5,-0.5;-1,1,-1,-1];
D = 1.25*eye(2);
p = plot(T(1,:),T(2,:));                % plot the triangle
axis([-10,10,-10,10])                   % set size of the graph
axis square                             % make the display square
figure(gcf)                             % display graphic window
% Adjust the windows on your screen so that both the command window
% and the graphics window show
hold on                                   % hold the current graph
for i = 1:40
   T = Q*T;                             % transform the figure
   set(p,'xdata',T(1,:),'ydata',T(2,:));  % erase original figure and
 plot
                                        % the transformed figure
   pause(0.1)                % adjust this pause to suit your computer
end

for i = 1:40
   T = W*T;                             % transform the figure
```

```
   set(p,'xdata',T(1,:),'ydata',T(2,:));  % erase original figure and
 plot
                                          % the transformed figure
   pause(0.1)                % adjust this pause to suit your computer
end
hold off
```

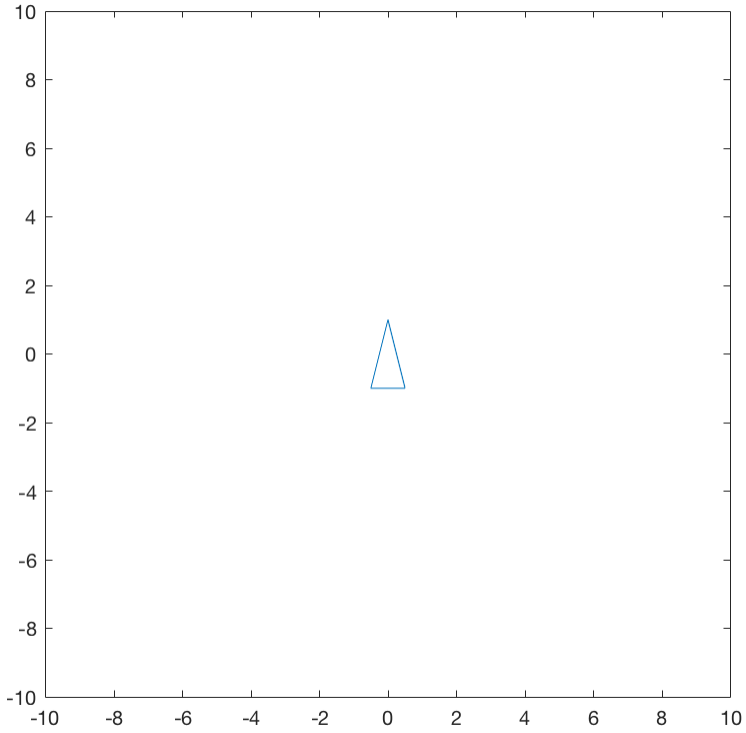
```
Q =

    0.9877   -0.1564
    0.1564    0.9877


W =

    0.9877    0.1564
   -0.1564    0.9877
```



Excercise 4

```
clf                                    %clear all settings for the
 plot
Q = [cos(pi/20), -sin(pi/20); sin(pi/20), cos(pi/20)]
W = [cos(-pi/20), -sin(-pi/20); sin(-pi/20), cos(-pi/20)]
```

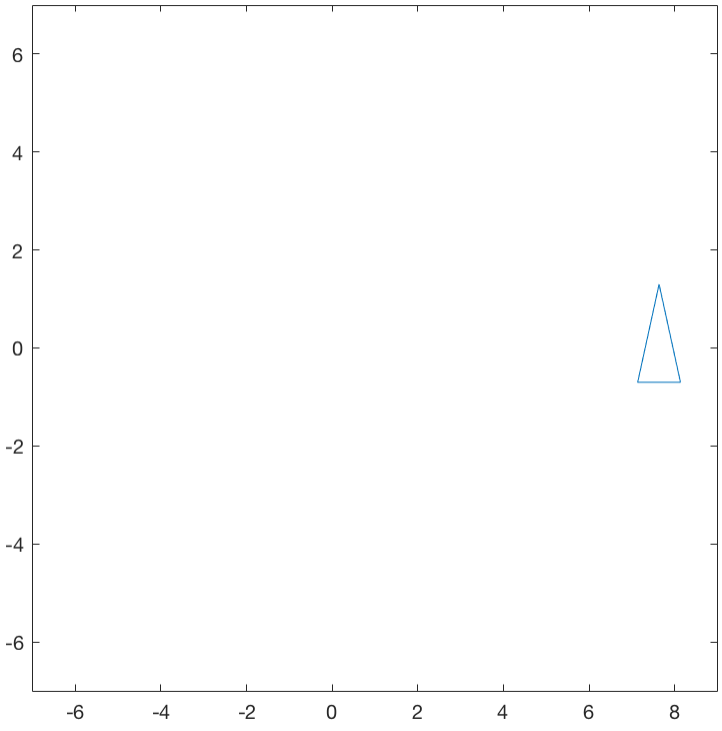
```
T = [-0.5,0,0.5,-0.5;-1,1,-1,-1];
D = 1.25*eye(2);
U = .8*eye(2);
p = plot(T(1,:),T(2,:));                % plot the triangle
axis([-10,10,-10,10])                   % set size of the graph
axis square                             % make the display square
figure(gcf)                             % display graphic window
% Adjust the windows on your screen so that both the command window
% and the graphics window show
hold on                                   % hold the current graph

for i = 1:10
   T = D*Q*T;                               % transform the figure
   set(p,'xdata',T(1,:),'ydata',T(2,:));  % erase original figure and
 plot
                                           % the transformed figure
   pause(0.1)               % adjust this pause to suit your computer
end

for i = 1:10
   T = U*W*T;                               % transform the figure
   set(p,'xdata',T(1,:),'ydata',T(2,:));  % erase original figure and
 plot
                                           % the transformed figure
   pause(0.1)               % adjust this pause to suit your computer
end

hold off


Q =

    0.9877   -0.1564
    0.1564    0.9877


W =

    0.9877    0.1564
   -0.1564    0.9877
```



Excercise 5

```
% (a)

clf
T=[-0.5,0,0.5,-0.5;-1,1,-1,-1;1,1,1,1];   % define the triangle in
 homogeneous coordinates
c1 =.1; c2 = .1;
M1 = [1,0,c1;0,1,c2;0,0,1];   % define the first translation matrix
M2 = [1,0,-c1;0,1,0;0,0,1];   % define the second translation matrix
M3 = [1,0,c1;0,1,-c2;0,0,1];
p = plot(T(1,:),T(2,:));   % plot the original triangle
axis([-7,7,-7,7])
axis square
figure(gcf)
for i = 1:20
    T = M1*T;   % compute the translated triangle
    set(p,'xdata',T(1,:),'ydata',T(2,:));  % plot the translated
 triangle
    pause(0.1)
end
for i = 1:40
    T=M2*T;   % compute the translated triangle
    set(p,'xdata',T(1,:),'ydata',T(2,:));  % plot the translated
 triangle
```

```
    pause(0.1)
end

for i = 1:20
    T=M3*T;   % compute the translated triangle
    set(p,'xdata',T(1,:),'ydata',T(2,:));  % plot the translated
 triangle
    pause(0.1)
end

% (b)

clf
Q = [cos(pi/40), -sin(pi/40), 0; sin(pi/40), cos(pi/40), 0; 0, 0, 1]
T=[-0.5,0,0.5,-0.5;-1,1,-1,-1;1,1,1,1];   % define the triangle in
 homogeneous coordinates
c1 =.1; c2 = .1;
M1 = [1,0,c1;0,1,c2;0,0,1];   % define the first translation matrix
M2 = [1,0,-c1;0,1,0;0,0,1];   % define the second translation matrix
M3 = [1,0,c1;0,1,-c2;0,0,1];
p = plot(T(1,:),T(2,:));   % plot the original triangle
axis([-7,9,-7,7])
axis square
figure(gcf)
for i = 1:20
    T = Q*M1*T;   % compute the translated triangle
    set(p,'xdata',T(1,:),'ydata',T(2,:));  % plot the translated
 triangle
    pause(0.1)
end
for i = 1:40
    T= Q*M2*T;   % compute the translated triangle
    set(p,'xdata',T(1,:),'ydata',T(2,:));  % plot the translated
 triangle
    pause(0.1)
end

for i = 1:20
    T= Q*M3*T;   % compute the translated triangle
    set(p,'xdata',T(1,:),'ydata',T(2,:));  % plot the translated
 triangle
    pause(0.1)
end


Q =

    0.9969   -0.0785         0
    0.0785    0.9969         0
         0         0    1.0000
```



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