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%% Julian Crummedyo %%  
%%% Robotics Homework 1 %%%
```

```
clear;  
clc;  
close all;  
%% #1: Matrix Manipulations in MATLAB
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```
A = [1 2 3; 0 1 0; 2 1 5]; % Defining matrix A  
disp(A); % Displaying matrix A
```

```
% Part A  
I_A = inv(A); % Finding the inverse of A  
disp(I_A); % Displaying the inverse
```

```
% Part B  
T_A = A.'; % Finding the Transpose of A  
disp(T_A); % Displaying the transpose
```

```
% Part C  
D_A = det(A); % Finding the determinant of A  
disp(D_A); % Displaying the Determinant  
%% #2: Vectors using MATLAB
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```
clear;  
clc;  
close all;
```

```
a = [1 2 3]; % Defining vector a  
b = [3 0 -1]; % Defining vector b
```

```
disp(a); % Displaying a  
disp(b); % Displaying b
```

```
% Part A  
a_m = norm(a); % Magnitude of a (found 'norm' function using Mathworks): https://www.mathworks.com/matlabcentral/answers/51478-how-can-i-calculate-the-magnitude-of-n-dimensional-vector-by-matlab-s-commands  
disp(a_m); % Displaying the magnitude
```

```
% Part B  
dot_ab = dot(a,b); % Calculating dot product off a and b  
disp(dot_ab); % Displaying the dot product
```

```
% Part C  
cross_ab = cross(a,b); % Calculating the cross product of a and b  
disp(cross_ab); % Displaying the cross product  
%% #3: Using MATLAB to check identities
```

```
clear;  
clc;  
close all;
```

```
A = rand(3); % Random matrix A  
B = rand(3); % Random matrix B
```

```
% Part A  
I_A = isequal(A*B, B*A); % Testing the identity A
```

```

disp(['Identity matrix A is ', mat2str(I_A)]); % Displaying result true/false (was able✓
to get an answer, but couldn't get true/false on my own, needed chat gpt to convert to✓
logical values ie: true/false versus 0/1)

% Part B
I_B = isequal((A*B)', B'*A'); % Testing the identity B
disp(['Identity matrix B is ', mat2str(I_B)]); % Displaying result true/false

% Part C
I_C = isequal((A + B)', A' + B'); % Testing the identity C
disp(['Identity matrix C is ', mat2str(I_C)]); % Displaying result true/false

% Part D
I_D = isequal(inv(A*B), inv(B)*inv(A)); % Testing the identity D
disp(['Identity matrix D is ', mat2str(I_D)]); % Displaying result true/false

% Part E
I_E = isequal((inv(A))', inv(A')); % Testing the identity E
disp(['Identity matrix E is ', mat2str(I_E)]); % Displaying result true/false
%% #4: MATLAB Functions

clear;
clc;
close all;

% Part B
theta = pi/2; % Defining theta
A = my_rotation(theta); % Redefining A
disp(A); % Display A

% Part C
t_v = linspace(0, pi, 100); % Defining theta values (100 total values)
total_product = eye(3); % Identifying the 3x3 identity matrix (got from Mathworks: https:✓
//www.mathworks.com/help/matlab/ref/eye.html)
for i = 1:length(t_v) % Find the rotation matrix for the current theta
    A = my_rotation(theta); % Redefining A
    total_product = total_product*A; % Calculating the new matrix
end
disp(total_product); % Display the final value
%% #5: Animation

```