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```
% Chapter 2 exercise 2
clc;
clear all
close all
```

### a) Write a function to plot the edges of a cube centered at the origin

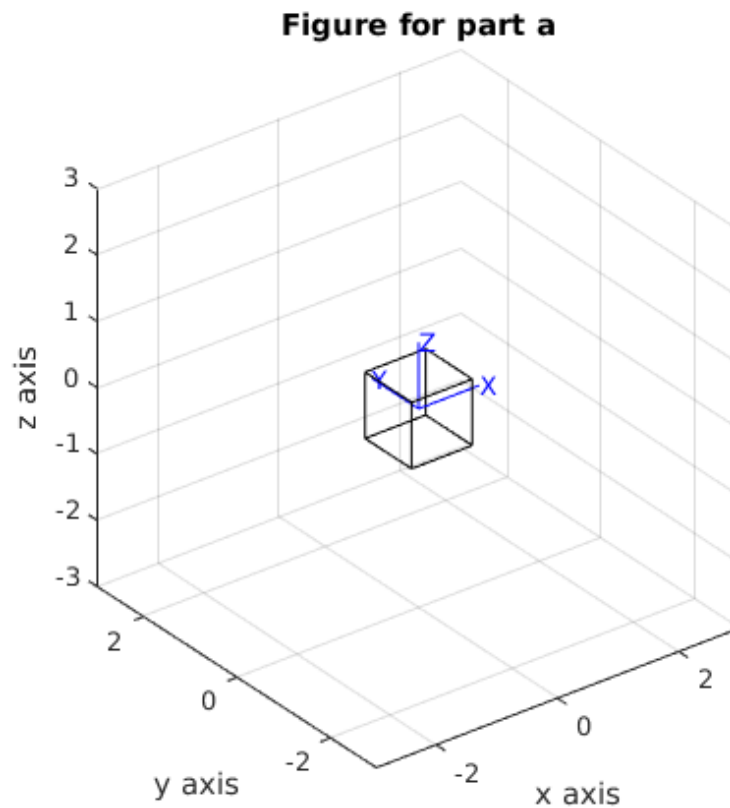
```
% vectors defining the eight vertices of a unit cube centered about [0
0 0]
% vert = [X Y Z 1]
vert_1 = [0.5 -0.5 -0.5 1];
vert_2 = [0.5 -0.5 0.5 1];
vert_3 = [-0.5 -0.5 0.5 1];
vert_4 = [-0.5 -0.5 -0.5 1];
vert_5 = [-0.5 0.5 -0.5 1];
vert_6 = [-0.5 0.5 0.5 1];
vert_7 = [0.5 0.5 0.5 1];
vert_8 = [0.5 0.5 -0.5 1];

% put together a matrix that plots nicely
A1 = [vert_1;
      vert_2;
      vert_3;
      vert_4;
      vert_5;
      vert_6;
      vert_7;
      vert_8;
      vert_1;
      vert_4;
      vert_3;
      vert_6;
      vert_5;
      vert_8;
      vert_7;
      vert_2];

% plot the cube
figure(1)
plot3(A1(:,1),A1(:,2),A1(:,3),'k')
hold on
```

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```
trplot
xlabel('x axis')
ylabel('y axis')
zlabel('z axis')
title('Figure for part a')
axis equal
axis([-3 3 -3 3 -3 3])
grid on
```



**b) modify the function to accept a homogeneous transform before plotting**

```
% define the transformation T
T = transl(2,2,1)*trotz(pi/4)*troty(-pi/4)*trotx(pi/6);

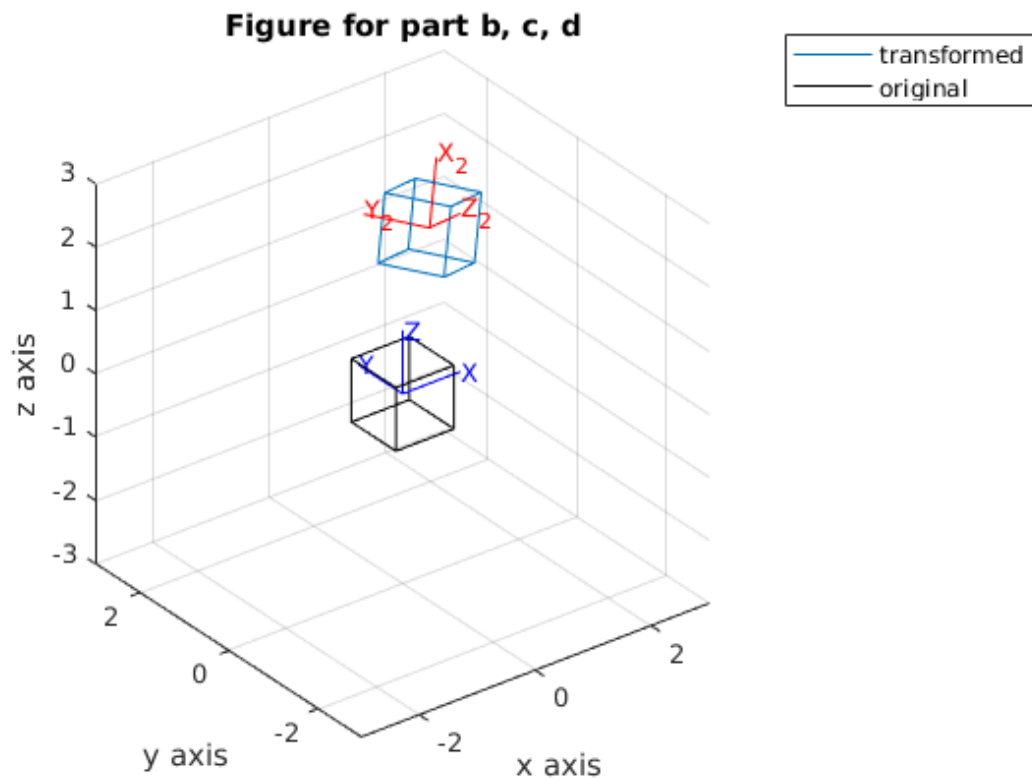
% create the new transformed vertices
vert_1_new = T*vert_1';
vert_2_new = T*vert_2';
vert_3_new = T*vert_3';
vert_4_new = T*vert_4';
vert_5_new = T*vert_5';
vert_6_new = T*vert_6';
vert_7_new = T*vert_7';
```

---

```
vert_8_new = T*vert_8';

% put together a matrix that plots nicely
A2 = [vert_1_new';
      vert_2_new';
      vert_3_new';
      vert_4_new';
      vert_5_new';
      vert_6_new';
      vert_7_new';
      vert_8_new';
      vert_1_new';
      vert_4_new';
      vert_3_new';
      vert_6_new';
      vert_5_new';
      vert_8_new';
      vert_7_new';
      vert_2_new'];

% plot the transformed cube and the original cube
figure(2)
plot3(A2(:,1),A2(:,2),A2(:,3),A1(:,1),A1(:,2),A1(:,3),'k')
hold on
trplot(T, 'frame', '2', 'color', 'r')
trplot
xlabel('x axis')
ylabel('y axis')
zlabel('z axis')
title('Figure for part b, c, d')
legend('transformed','original')
axis equal
axis([-3 3 -3 3 -3 3])
grid on
```



### c) Animate rotation about the x-axis

done

### d) Animate rotation about all axes

done

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