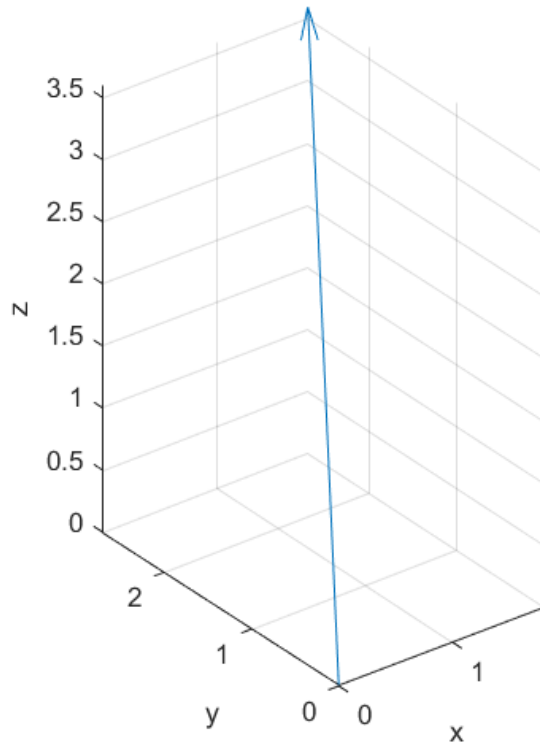


Lab 7 - Working with Image

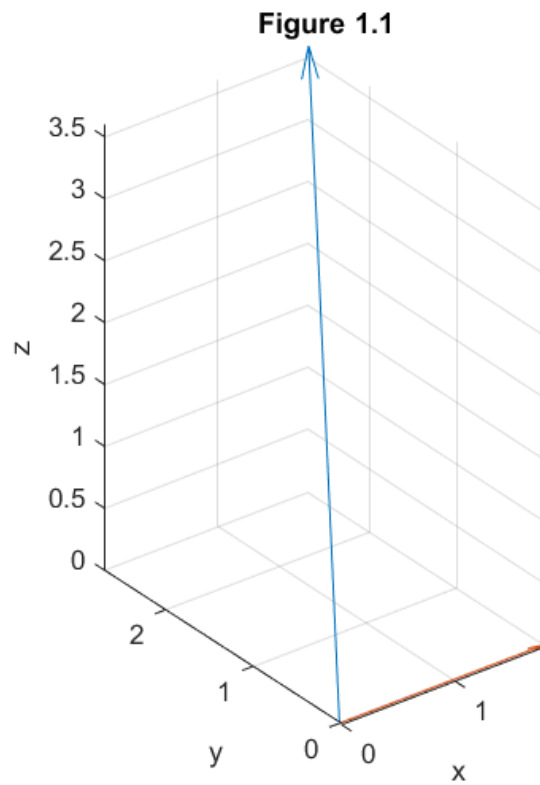
0. Plot a Vector in Matlab

```
quiver3(0,0,0,2,3,4);  
%how to plot a vector a = (2,3,4) for this lab  
axis equal  
xlabel('x')  
ylabel('y')  
zlabel('z') %labels for the vector
```

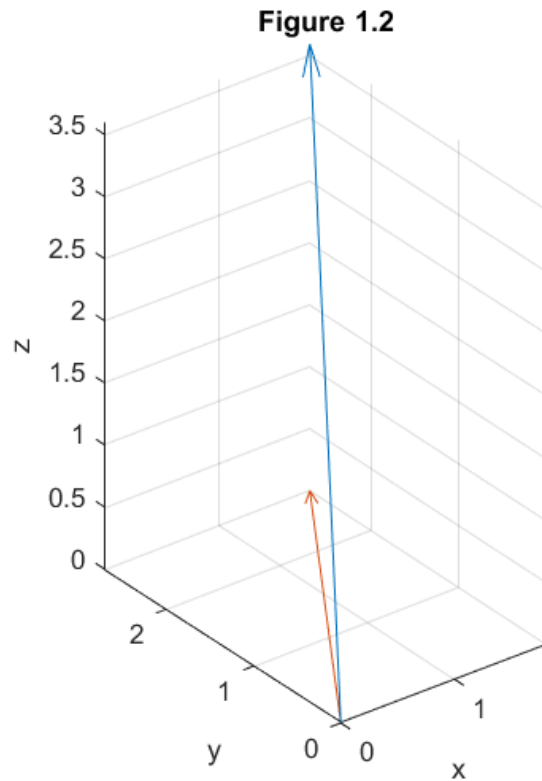


1. Projection

```
figure  
quiver3(0,0,0,2,3,4) %plot a  
hold on  
quiver3(0,0,0,2,0,0) %plot Px of a  
title('Figure 1.1')  
axis equal  
xlabel('x')  
ylabel('y')  
zlabel('z')  
hold off
```



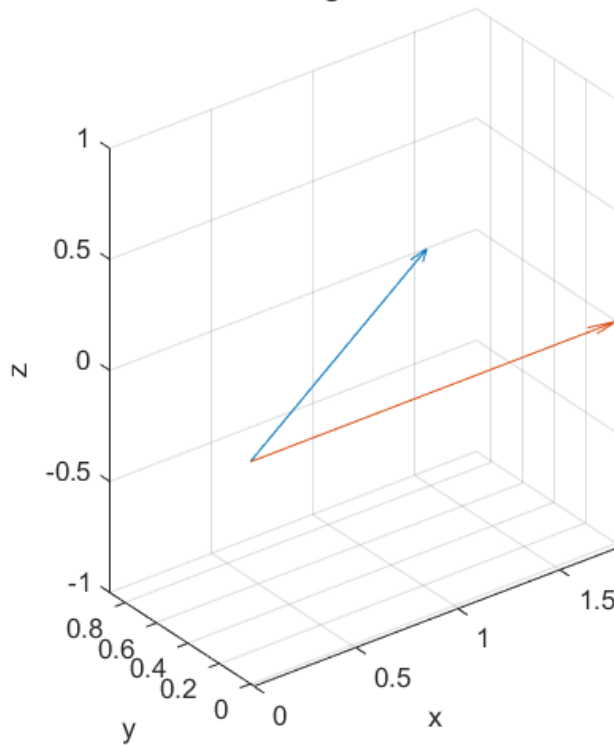
```
figure
quiver3(0,0,0,2,3,4) %plot a
hold on
quiver3(0,0,0,2,3,0) %plot Pxy of a
title('Figure 1.2')
axis equal
xlabel('x')
ylabel('y')
zlabel('z')
hold off
```



2. Rotation Matrix

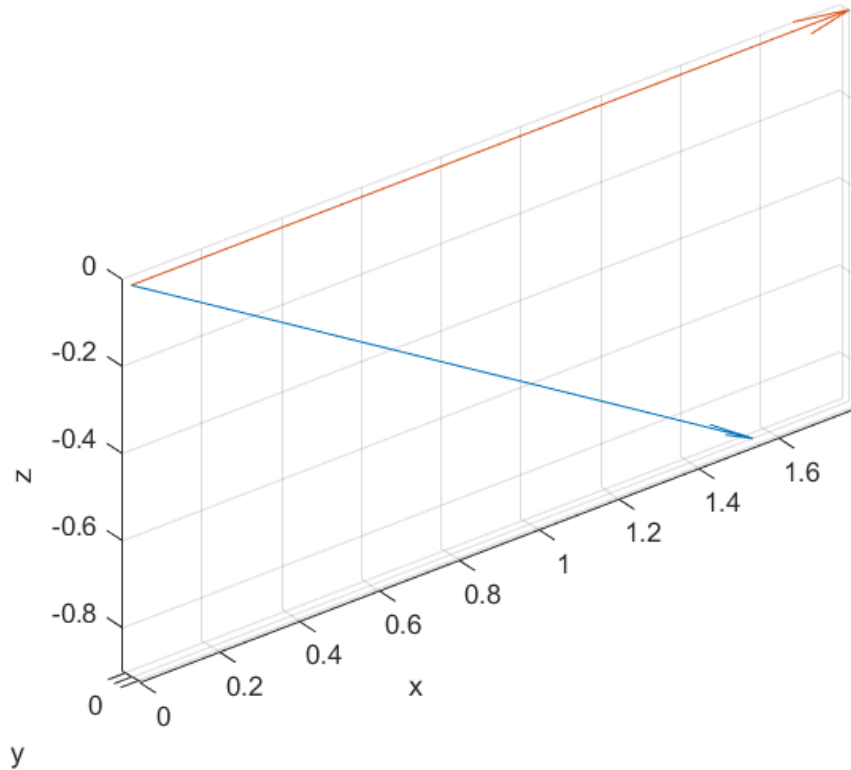
```
Rz = [cosd(30) -sind(30) 0; sind(30) cosd(30) 0; 0 0 1];
%rotation matrix around z-axis at a degree of 30
Px = [2; 0; 0];
PxRotz = Rz*Px;
%getting the value of Px after using the rotation matrix
figure
quiver3(0,0,0,PxRotz(1), PxRotz(2), PxRotz(3))
%plot rotated vector
hold on
quiver3(0,0,0, Px(1),Px(2),Px(3))
%plot original vector
title('Figure 2.1')
axis equal
xlabel('x')
ylabel('y')
zlabel('z')
hold off
```

Figure 2.1



```
Ry = [cosd(30) 0 sind(30); 0 1 0; -sind(30) 0 cosd(30)];  
%rotation matrix around z-axis at a degree of 30  
Px = [2;0;0];  
PxRoty = Ry*Px;  
%getting the value of Px after using the rotation matrix  
figure  
quiver3(0,0,0,PxRoty(1), PxRoty(2), PxRoty(3))  
%plot rotated vector  
hold on  
quiver3(0,0,0, Px(1),Px(2),Px(3))  
%plot original vector  
title('Figure 2.2')  
axis equal  
xlabel('x')  
ylabel('y')  
zlabel('z')  
hold off
```

Figure 2.2



3. Image Compression by SVD

```
raw = imread('cameraman.tif'); %load the cameraman image
figure
imshow(raw);
```



```
UFO = imread('UFO.png'); %load UFO image
% Next few lines remove UFO image background
% and move it to the corner of the cameraman image
```

```

UF01 = 255-UF0;
raw(1:36,1:81)=raw(1:36,1:81)+UF01;
raw(1:36,1:81)=raw(1:36,1:81)-UF01;
figure
imshow(raw) % show the new image with the UFO

```



```

raw = imread('cameraman.tif'); %reload cameraman image
UF01 = 255-UF0;
x=60; %values to move UFO from corner to in front of camera
y=170;
raw(1+x:36+x,1+y:81+y)=raw(1+x:36+x,1+y:81+y)+UF01;
raw(1+x:36+x,1+y:81+y)=raw(1+x:36+x,1+y:81+y)-UF01;
figure
imshow(raw) % show the new image with the UFO
title('Figure 3.1 - Cameraman VS UFO')

```

Figure 3.1 - Cameraman VS UFO



```
A=single(raw); %compressing image with functions
I=uint8(A);
imshow(I);
```



```
[U,S,V] = svd(A); %compressing image with svd function
A_new=U*S*V';
I_new=uint8(A_new);
imshow(I_new);
```



```
figure %plotting compressed versions of the image
subplot(2,2,1)
imshow(raw);
title('raw')
S2=[S(:,1:2) zeros(256, 256-2)];
A_2=U*S2*V';
I_2 = uint8(A_2);
```

```

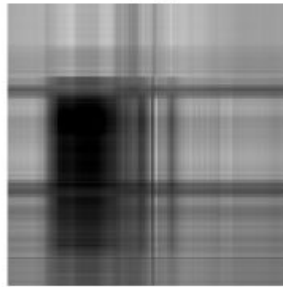
subplot(2,2,2)
imshow(I_2)
title('n=2')
S32=[S(:,1:32) zeros(256, 256-32)];
A_32=U*S32*V';
I_32 = uint8(A_32);
subplot(2,2,3)
imshow(I_32)
title('n=32')
S128=[S(:,1:128) zeros(256, 256-128)];
A_128=U*S128*V';
I_128 = uint8(A_128);
subplot(2,2,4)
imshow(I_128)
title('n=128')

```

raw



n=2



n=32



n=128

