# 267: HW#1

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# Problem 1

**In the MATLAB code below, the "edge" command was used to apply convolution using Sobel and Prewitt edge operator.**
**>> I=imread('Lena.png');**
**>> G=rgb2gray(I);**
**>> imshow(G)**
**>> CG=edge(G,'sobel');**
**>> imshow(CG)**
**>> CP=edge(G,'prewitt');**
**>> imshowpair(CG,CP,'montage')**
**Using the "conv2" command as shown below, show the same results as above.**
**>> sx=[-1 0 1; -1 0 1; -1 0 1];**
**>> xx=conv2(G,sx);**

The MATLAB code is provided in Fig.1:

```
I=imread('Lenna.png'); %Loading the image
G=rgb2gray(I);          %Convering to gray image
GD = im2double(G); % Convert to double
% Corrected masks
b=[-1 -1 -1;0 0 0;1 1 1];
c=[-1 0 1; -1 0 1; -1 0 1];
Gx=abs(conv2(GD,c,'same'));   %Convolution
Gy=abs(conv2(GD,b,'same'));
G = sqrt( Gx.^2 + Gy.^2);
out = G > 0.5;              %Threshold image
%Also show output from edge
CP=edge(GD,'Prewitt', [], 'both', 'nothinning');
imshowpair(out,CP,'montage')
title('Problem 1')
```
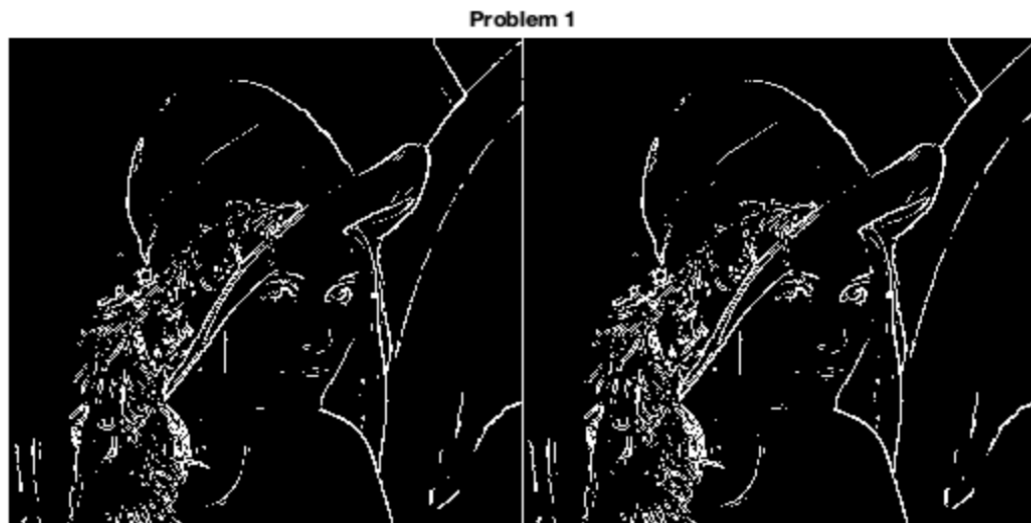


Fig.1: Edge detected image by Conv2 (left). Edge detected image by Prewitt (right)

Fig.2: The main image (Lenna)


Fig.3: Gray Lenna image

Fig. 4: Lenna main image (left), Lenna image after applying Sobel.



Fig. 5: Lenna image convolved with Sobel (left). Lenna image convolved with Prewitt.

# Problem 2

**Repeat the example in the Matlab document titled "Classify Webcam Images Using Deep Learning". Classify some other objects to repeat the example and attach the screen copy of the results.**

The following figures show the classified object and the probability of this classification.



cellular telephone
0.7



toilet tissue
0.53

coffee mug
0.65
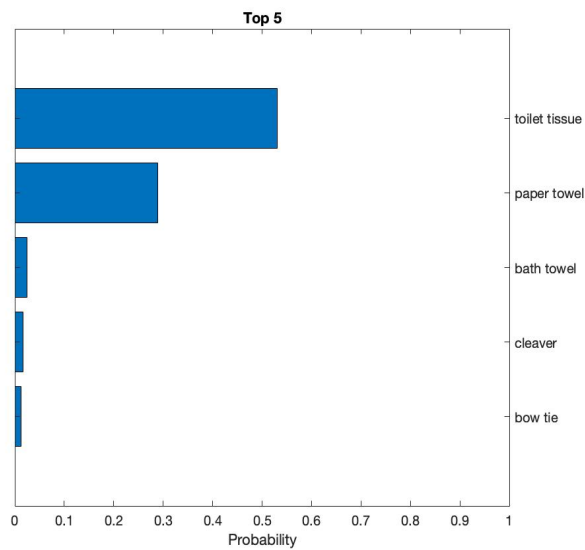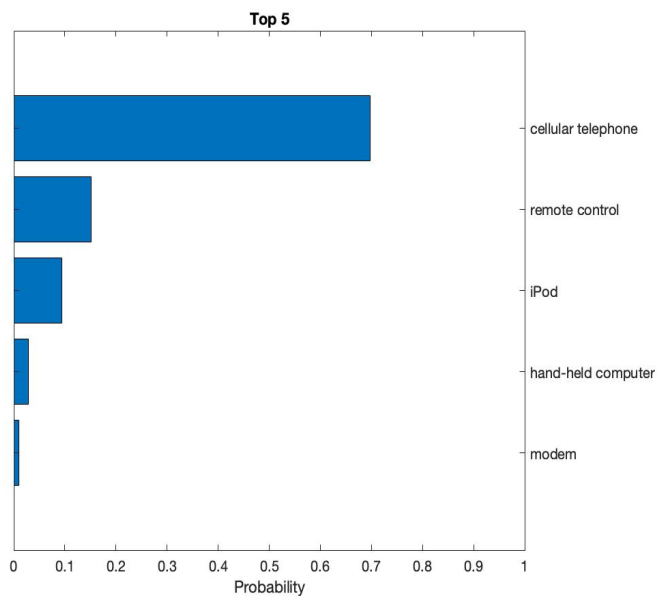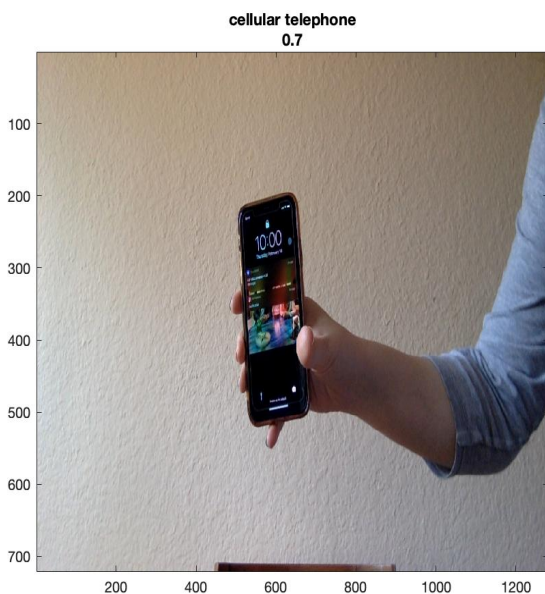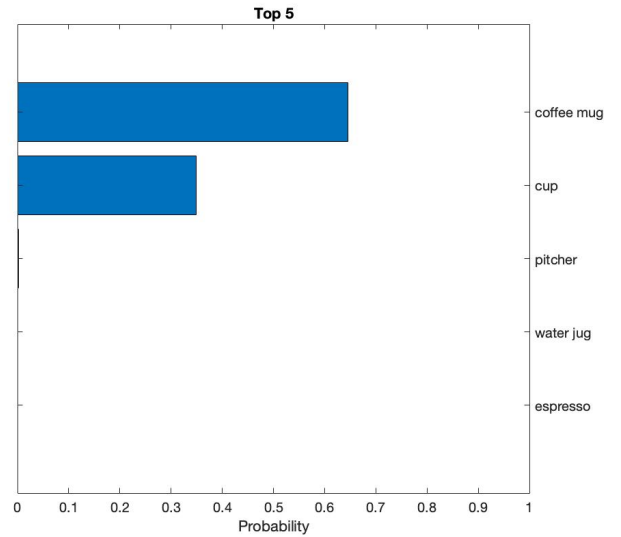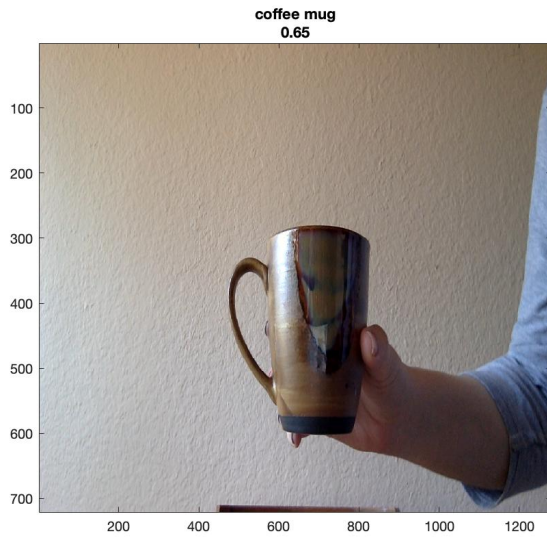
# Problem 3

**Write the MATLAB code to train the best codebook for the following 8x8 image.**

The code is provided in three.mat

The new representation is:

```
0   0   2   0
0   1   2   0
0   1   2   3
2   0   0   1
```

The updated Codebook is:

```
 61   63    67   69
 66   99    69   95
106   80   106   84
 68   70   588   75
```