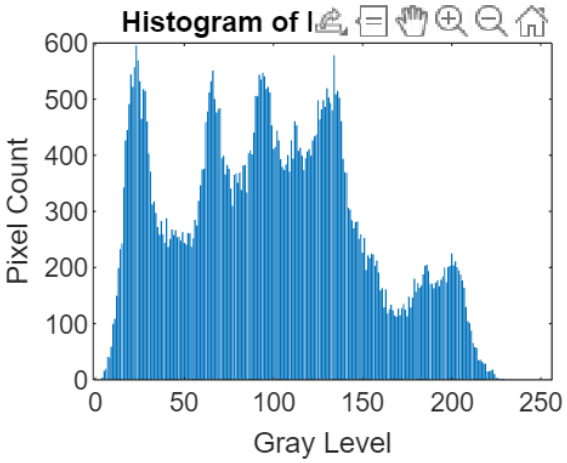
```
%Question 1
clc
clear all
close all
% Loading the grayscale image
img = imread('lena.tif');
```

```
%Question 2
% Calculating the histogram of pixel intensities
[pixelCounts, grayLevels] = imhist(img);

% Ploting the histogram
bar(grayLevels, pixelCounts);
title('Histogram of Pixel Intensities');
xlabel('Gray Level');
ylabel('Pixel Count');
```




```
% Calculating the probability of occurrence for each gray level
numPixels = numel(img);
probabilities = pixelCounts/numPixels
```

```
probabilities = 256×1
         0
         0
         0
    0.0000
    0.0001
    0.0002
    0.0003
    0.0006
    0.0006
    0.0009
     ⋮
```

```
[codes, avg_length] = huffmandict(0:255, probabilities)
```

codes = 256×2 cell

	1	2
1	0	1×42 double
2	1	1×42 double
3	2	1×41 double
4	3	1×17 double
5	4	1×14 double
6	5	1×12 double
7	6	1×12 double
8	7	1×11 double
9	8	1×11 double
10	9	[1,0,0,0...
11	10	[1,1,1,0...
12	11	[1,1,0,0...
13	12	[0,0,1,0...
14	13	[1,1,1,1...

⋮

avg_length = 7.5947

```
entropy = 0;
for i = 1:length(codes)
    if probabilities(i) ~= 0
    entropy = entropy - probabilities(i) .* log2(probabilities(i));
    end
end
entropy
```

entropy = 7.5683

```
efficiency = entropy / avg_length*100
```

efficiency = 99.6518