

Answer in the table provided below: [10 points, each question is one point]

A. Matlab:

```
>> Y=[111 114 117; 60 50 200;30 35 150]
T=70
```

Q.1 Output of Matlab command $(Y>T).*Y$ is

Q.2 Output of Matlab command $(Y>T).(T*ones(3,3))$ is

B. Intenity models:

For designing a specific classifier, a training data was composed from a grey scale images Y that has 4 grey levels $Q = \{0,1,2,3\}$. The image Y was classified into one of two lables $L = \{0,1\}$ to produce a labeled image X . If the joint probability $P(Y, X)$ for each class is

$$P(Y, X = 0) = [0.25 \ 0.20 \ 0.10 \ 0.05], \text{ and } P(Y, X = 1) = [0.05 \ 0.05 \ 0.10 \ 0.20]$$

Answer the following:

Q.3 Compute the normalized histogram of the grey-level image

Q.4 Compute the prior probabilities

Q.5 Classify the test image $Test = [3 \ 2 \ 2 \ 1; 0 \ 2 \ 1 \ 3]$ using the Bayes classifier

C. Medical Image modalities:

Q.6 If someone has a broken bone, what will be the best modality to scan it?

- (a) X-ray (b) MRI (c) Ultrasound (d) Nuclear imaging

Q.7 If someone has a problem in his/her muscle, what will be the best modality to scan it

- (a) X-ray (b) MRI (c) Ultrasound (d) Nuclear imaging

Q.8 If someone has a tumor in his/her lung, what will be the best modality to follow it

- (a) X-ray (b) MRI (c) Ultrasound (d) Computed Tomography

Q.9 In, radiopharmaceuticals (مواد مشعة) are taken internally, for example, intravenously or orally. Then, external detectors capture and form images from the radiation emitted by the radiopharmaceuticals.

- (a) X-ray (b) MRI (c) Ultrasound (d) Nuclear imaging

Q.10 If someone wants to image pregnant (حامل) women, what will be the best modality to scan it

- (a) X-ray (b) MRI (c) Ultrasound (d) Nuclear imaging

الاسم: الفصل:									
Q.1	$[1 \ 1 \ 1; 0 \ 0 \ 1; 0 \ 0 \ 1].*Y=[111 \ 114 \ 117; 0 \ 0 \ 200; 0 \ 0 \ 150]$								
Q.2	$[1 \ 1 \ 1; 0 \ 0 \ 1; 0 \ 0 \ 1].*[70 \ 70 \ 70; 70 \ 70 \ 70; 70 \ 70 \ 70]=[210 \ 210 \ 210; 70 \ 70 \ 70; 70 \ 70 \ 70]$								
Q.3	$p(y) = P(Y, X = 0) + P(Y, X = 1) = [0.3 \ 0.25 \ 0.2 \ 0.25]$								
Q.4	$p(x = 0) = \sum_{q=0}^3 P(Y, X = 0) = 0.6 \quad p(x = 1) = \sum_{q=0}^3 P(Y, X = 1) = 0.4$								
Q.5	$Test = [3 \ 2 \ 2 \ 1; 0 \ 2 \ 1 \ 3] \rightarrow X=[1000;0001]$								
Q.6	a	Q.7	b	Q.8	d	Q.9	d	Q.10	c