2-

***For image I:***

| Level(K) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| Pr(K) | 0 | 0.1 | 0.1 | 0.3 | 0 | 0 | 0.4 | 0.1 |
| Pr(n) | 0 | 0.1 | 0.2 | 0.5 | 0.5 | 0.5 | 0.9 | 1 |
| H=INT((k-1) *Pr(n)+0.5) | 0 | 1 | 1 | 4 | 4 | 4 | 6 | 7 |

***For desired image:***

| Level(K) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| Pz(K) | 0 | 0.1 | 0.2 | 0.4 | 0.2 | 0.1 | 0 | 0 |
| Pz(n) | 0 | 0.1 | 0.3 | 0.7 | 0.9 | 1 | 1 | 1 |
| S=INT((k-1) *Pz(n)+0.5) | 0 | 1 | 2 | 5 | 6 | 7 | 7 | 7 |

| levels | H | S | map |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 |
| 2 | 1 | 2 | 1 |
| 3 | 4 | 5 | 3 |
| 4 | 4 | 6 | 3 |
| 5 | 4 | 7 | 3 |
| 6 | 6 | 7 | 4 |
| 7 | 7 | 7 | 5 |

In order to modify Image to match the target histogram, first we need to do some math. I computed the cumulative distribution values in the image and target dataset and map the values. the last column of the last table is mapping values which means every zero value in image stays zero and also ones stay one but 4 values change to 3, 6s change to 4 and 7s change to 5.

4-Label the following 8x8 binary picture using:

- 4-connectivity
- 8-connectivity

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

- 4-connectivity

- 8-connectivity