Digital Image Processing HW1 Parth Pujari and Aayushi Barve

1 Question 3

To find the probability distribution of I + J we use the fact that \mathcal{P}_I and \mathcal{P}_J are independent. The probability that I and J sum to a value k and I equals i is $\mathcal{P}_I(i) \cdot \mathcal{P}_J(k-i)$. Thus, the final probability is the summation over all such 'i's

$$\mathcal{P}_{sum}(I+J=k) = \sum_{i=0}^{k} \mathcal{P}_{I}(I=i) \cdot \mathcal{P}_{J}(J=k-i)$$
(1)

This is nothing but a convolution $(\mathcal{P}_I * \mathcal{P}_J)(k)$