1 Q3

We can denote random variable X for representing intensity at a location given the pdf $p_x(x)$ for image I.

Similarily random variable Y for image J given PDF $p_y(y)$.

Let $Z = X + Y$ represent random variable for image $I + J$. We need to find pdf $p_z(z)$ for random variable Z.

For $Z = z$,

$$Y = z - X$$

Now X can vary from $(0, z)$ and Y will have corresponding values from $(z, 0)$. And as both random variable are independent, we can write

$$p_z(z) = \sum_{i=0}^{z} p_x(i) p_y(z - i)$$

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