- Consider a continuous r.v. X with a continuous pdf $f(x)$.
- Define a discrete r.v. $\hat{X}_\Delta$ by

$$\hat{X}_\Delta = i \quad \text{if} \quad X \in [\, i\Delta, (i+1)\Delta).$$

- $\hat{X}_\Delta$ is a quantization of X with resolution Δ.
- Since $f(x)$ is continuous,

$$p_i = \Pr\{\hat{X}_\Delta = i\} \approx f(x_i)\Delta$$

where $x_i \in [\, i\Delta, (i+1)\Delta)$.