- Suppose that n samples $\mathbf{x_1}, \ldots, \mathbf{x_n}$ are drawn i.i.d. according to the distribution $p(\mathbf{x})$.

- The probability P that a vector $\mathbf{x}$ will fall in a region $\mathcal{R}$ is given by

$$P = \int_{\mathcal{R}} p(\mathbf{x'})d\mathbf{x'}.$$

- The probability that k of the n will fall in $\mathcal{R}$ is given by the binomial law

$$P_k = \binom{n}{k} P^k (1 - P)^{n-k}.$$

- The expected value of k is $E[k] = nP$ and the MLE for P is $\hat{P} = \frac{k}{n}$.