Binomial distribution

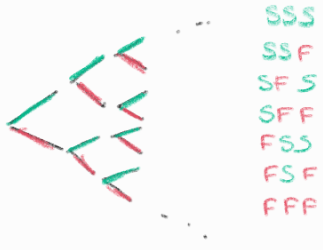
Parameters n, p

Discrete proba of # successes in a sequence of n independant experiments asking a yes/no question, with $\Pr[\text{success}] = p$.

$$\begin{cases} n \in \mathbb{N} & \text{\# trials} \\ p \in [0,1] & \text{success probability for each trial} \end{cases}$$

$$\Pr[k \text{ successes for } n \text{ trials}] = \binom{n}{k} p^k q^{n-k}$$

$= $ # ways to arrange k successes among n trials, with no remise $\times$ $p(\text{success})^k \times p(\text{failure})^{n-k}$



All outcomes are equiprobable

For k successes among n experiments there are $\binom{n}{k}$ possible sequences SFS or FFF...

Each experiment has outcome of proba $\begin{cases} p \text{ (if S)} \\ 1-p \text{ (if F)} \end{cases}$

Hence $\binom{n}{k} p^k (1-p)^{n-k}$

$$\begin{cases} \langle k \rangle = np \\ \sigma^2 = npq \end{cases}$$

Poisson distribution

Discrete proba distribution expressing proba of a given # events occuring in a fixed interval of time or space if these event occur with a constant mean rate independantly of the time since last event.

Parameter : $\lambda \in]0, \infty[$ (rate)

$$\Pr[k \text{ events}] = \frac{\lambda^k e^{-\lambda}}{k!}$$

$$\langle k \rangle = \sigma = \lambda$$