Formulae for distributions
(topic 8.2, further mathematics SL topic 2.2)

Discrete distributions

Distribution	Notation	Probability mass function	Mean	Variance
Bernoulli	$X \sim \mathrm{B}(1, p)$	$p^x(1-p)^{1-x}$ for $x = 0, 1$	p	$p(1-p)$
Binomial	$X \sim \mathrm{B}(n, p)$	$\binom{n}{x} p^x (1-p)^{n-x}$ for $x = 0,1,\ldots,n$	np	$np(1-p)$
Hypergeometric	$X \sim \mathrm{Hyp}(n, M, N)$	$\dfrac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$ for $x = 0,1,\ldots,n$	np where $p = \dfrac{M}{N}$	$np(1-p)\left(\dfrac{N-n}{N-1}\right)$ where $p = \dfrac{M}{N}$
Poisson	$X \sim \mathrm{P_o}(m)$	$\dfrac{m^x \mathrm{e}^{-m}}{x!}$ for $x = 0,1\ldots$	m	m
Geometric	$X \sim \mathrm{Geo}(p)$	pq^{x-1} for $x = 1,2,\ldots$	$\dfrac{1}{p}$	$\dfrac{q}{p^2}$
Negative binomial	$X \sim \mathrm{NB}(r, p)$	$\binom{x-1}{r-1} p^r q^{x-r}$ for $x = r,\ r+1,\ldots$	$\dfrac{r}{p}$	$\dfrac{rq}{p^2}$
Discrete uniform	$X \sim \mathrm{DU}(n)$	$\dfrac{1}{n}$ for $x = 1,\ldots,n$	$\dfrac{n+1}{2}$	$\dfrac{n^2-1}{12}$

Continuous distributions

Distribution	Notation	Probability density function	Mean	Variance
Uniform	$X \sim \mathrm{U}(a,b)$	$\frac{1}{(b-a)},\ a \le x \le b$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Exponential	$X \sim \mathrm{Exp}(\lambda)$	$\lambda \mathrm{e}^{-\lambda x},\ \ x \ge 0$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$
Normal	$X \sim \mathrm{N}(\ \ ,\sigma^2)$	$\frac{1}{\sigma\sqrt{2\pi}} \mathrm{e}^{-\frac{1}{2}\left(\frac{x-}{\sigma}\right)^2}$		σ^2