Facts about standard distributions

Binomial distribution

Parameters are n and p. Range is the integers from 0 to n.

Written $X \sim \text{binomial}(n, p)$.

Probability mass function: $f_X(x) = \binom{n}{x} p^x (1-p)^{n-x}$, where $\binom{n}{x} = \frac{n!}{x!(n-x)!}$

Mean: $E(X) = np$

Variance: $\text{Var}(X) = np(1-p)$

Geometric distribution

Parameter is p. Range is the integers from 0 up.

Written $X \sim \text{geometric}(p)$.

Probability mass function: $f_X(x) = p(1-p)^x$

Mean: $E(X) = (1-p)/p$

Variance: $\text{Var}(X) = (1-p)/p^2$

Poisson distribution

Parameter is λ. Range is the integers from 0 on up.

Written $X \sim \text{Poisson}(\lambda)$.

Probability mass function: $f_X(x) = e^{-\lambda}\lambda^x/x!$

Mean: $E(X) = \lambda$

Variance: $\text{Var}(X) = \lambda$

Exponential distribution

Parameter is β. Range is the positive real numbers.

Written $X \sim \exp(\beta)$.

Probability density function: $f_X(x) = \beta \exp(-\beta x)$

Mean: $E(X) = 1/\beta$

Variance: $\text{Var}(X) = 1/\beta^2$

Normal distribution

Parameters are μ and σ. Range is the real numbers.

Written $X \sim \text{N}(\mu, \sigma^2)$.

Probability density function: $f_X(x) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left(-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right)$

Mean: $E(X) = \mu$

Variance: $\text{Var}(X) = \sigma^2$

Table of the CDF for the $N(0,1)$ distribution:

x	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	$+0.5$	$+1.0$	$+1.5$	$+2.0$	$+2.5$	$+3.0$
$P(X \le x)$	0.001	0.006	0.023	0.067	0.159	0.309	0.500	0.691	0.841	0.933	0.977	0.994	0.999