Discrete distributions
(sample space is a subset of the integers)

Discrete uniform(a, b) a, b ∈ Z, a < b
Equally likely events labelled with integers from a to b.

PMF	$1/n \quad n = b - a + 1$
Support	$\{a, a+1, ..., b-1, b\}$
Mean	$\frac{a+b}{2}$
Variance	$\frac{n^2-1}{12}$

Bernoulli(p) p ∈ [0, 1]
An event with two outcomes:
1 = success, 0 = failure

PMF	$1-p \quad x=0$ $p \quad x=1$
Support	$\{0, 1\}$
MGF	$1 - p + pe^t$
Mean	p
Variance	$p(1-p)$

Binomial(n, p) n = 1, 2, 3, ...; p ∈ [0, 1]
The number of successes in n Bernoulli(p) trials (a count)

PMF	$\binom{n}{x} p^x (1-p)^{n-x}$
Support	$\{0, 1, ..., n\}$
MGF	$(1 - p + pe^t)^n$
Mean	np
Variance	$np(1-p)$

Geometric(p) p ∈ [0, 1]
The number of successes in Bernoulli(p) trials until one failure.

PMF	$(1-p)p^x$
Support	$\{0, 1, 2, ...\}$
MGF	$\frac{1-p}{1-pe^t}$
Mean	$\frac{p}{1-p}$
Variance	$\frac{p}{(1-p)^2}$

Negative binomial(r, p) r = 1, 2, 3, ... p ∈ [0, 1]
The number of successes in Bernoulli(p) trials until r failures.

PMF	$\binom{x+r-1}{x}(1-p)^r p^x$
Support	$\{0, 1, 2, ...\}$
MGF	$\left(\frac{1-p}{1-pe^t}\right)^r$
Mean	$r\frac{p}{1-p}$
Variance	$r\frac{p}{(1-p)^2}$

Poisson(λ) λ > 0
Count of events that have constant rate, and are independent of one another.

PMF	$\frac{\lambda^x e^{-\lambda}}{x!}$
Support	$\{0, 1, 2, ...\}$
MGF	$\exp(\lambda(e^t - 1))$
Mean	λ
Variance	λ

Continuous distributions

(sample space is an interval on the real line)

Uniform(a, b) a, b ∈ R

Likelihood of event proportional to it's length.

PDF	$\frac{1}{b-a}$
CDF	$\frac{x-a}{b-a}$
Support	$[a, b]$
Mean	$\frac{a+b}{2}$
Variance	$\frac{(b-a)^2}{12}$

Exponential(θ) θ > 0

Waiting time until a Poisson event with average waiting time θ.

PDF	$\frac{1}{\theta}e^{-x/\theta}$
CDF	$1-e^{-x/\theta}$
Support	$[0, \infty)$
MGF	$\frac{1}{1-\theta t}$
Mean	θ
Variance	θ^2

Exponential(λ) λ > 0

Waiting time until a Poisson event with rate λ.

PDF	$\lambda e^{-x\lambda}$
Mean	$1/\lambda$

Gamma(α, θ) α > 0, θ > 0

Waiting time for α Poisson events with average waiting time θ.

PDF	$\frac{\theta^{-\alpha}}{\Gamma(\alpha)}x^{\alpha-1}e^{-x/\theta}$
CDF	No closed form
Support	$[0, \infty)$
MGF	$\frac{1}{(1-\theta t)^{\alpha}}$
Mean	$\alpha\theta$
Variance	$\alpha\theta^2$

Gamma(α, β) β > 0, θ > 0

Waiting time for α Poisson events with rate β.

PDF	$\frac{\beta^{\alpha}}{\Gamma(\alpha)}x^{\alpha-1}e^{-\beta x}$
Mean	α/β

Normal(μ,σ²) μ ∈ R, σ² > 0

PDF	$\frac{1}{\sqrt{2\pi}\sigma}e^{-\frac{(x-\mu)^2}{2\sigma^2}}$
CDF	$\Phi(x)$
Support	$(-\infty, \infty)$
MGF	$\exp(\mu t + \frac{1}{2}\sigma^2 t^2)$
Mean	μ
Variance	σ^2