Prof. Richard B. Goldstein – Discrete and Continuous Probability Distributions

Discrete

Distribution	f(x)	mean	variance	practical uses
Binomial	$\binom{n}{x} p^x (1-p)^{n-x}$ $x = 0, 1, 2, \ldots, n$	np	np(1-p)	x successes out of n trials
Geometric	$p(1-p)^{x-1}$ $x = 1, 2, 3, \ldots$	$\frac{1}{p}$	$\frac{(1-p)}{p^2}$	first success occurs on trial #x
Poisson	$\frac{e^{-\lambda}\lambda^x}{x!}$ $x = 0, 1, 2, \ldots$	λ	λ	x successes given λ were expected

Continuous

Distribution	f(x)	mean	variance	practical uses
Chi-Square	see below •	n	2n	goodness-of-fit tests single variance test
Exponential	$\lambda e^{-\lambda x}$ on $[0, \infty)$	$1/\lambda$	$1/\lambda^2$	queues, memory-less
F	see below •	$\frac{n_2}{n_2 - 2}$	complicated	hypothesis tests comparing two variances
Normal	$\frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{\{x-\mu\}^2}{2\sigma^2}}$ on $(-\infty, \infty)$	μ	σ^2	standard bell-shaped distribution used on errors, test scores
Student-T	see below •	0	$\frac{n}{n-2}$ if $n > 2$	hypothesis tests comparing means
Uniform	$\frac{1}{b-a}$ on $[a, b]$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	random numbers on [0, 1]

- probdist.pdf contains more distributions and formulas