

Appendix A

Sample Distribution Functions

This appendix gives the basic distributions used in the text. We provide their means and variances. Tables of numerical data for these distributions are easily available on the web. One such website is <http://stattrek.com/>.

A.1 Discrete Random Variables

Uniform: $U[1, n]$

$$P(\xi = i) = \frac{1}{n}, \quad i = 1, \dots, n, \quad n \geq 1,$$

with $E[\xi] = \frac{n+1}{2}$ and $\text{Var}[\xi] = \frac{n^2-1}{12}$.

Binomial: $Bi(n, p)$

$$P(\xi = i) = \binom{n}{i} p^i (1-p)^{n-i}, \quad i = 0, 1, \dots, n; \quad 0 < p < 1,$$

with $E[\xi] = np$ and $\text{Var}[\xi] = np(1-p)$.

Poisson: $P(\lambda)$

$$P(\xi = i) = e^{-\lambda} \frac{\lambda^i}{i!}, \quad \lambda > 0, \quad i = 0, 1, \dots,$$

with $E[\xi] = \lambda$ and $\text{Var}[\xi] = \lambda$.

A.2 Continuous Random Variables

Uniform: $U[0, a]$

$$f(\xi) = \frac{1}{a}, \quad 0 \leq \xi \leq a, \quad a > 0,$$

with $E[\xi] = \frac{a}{2}$ and $\text{Var}[\xi] = \frac{a^2}{12}$.

Exponential: $\exp(\lambda)$

$$f(\xi) = \lambda e^{-\lambda \xi}, \quad 0 \leq \xi, \quad \lambda > 0,$$

with $E[\xi] = \frac{1}{\lambda}$ and $\text{Var}[\xi] = \left(\frac{1}{\lambda}\right)^2$.

Normal: $N(\mu, \sigma^2)$

$$f(\xi) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(\xi-\mu)^2}{2\sigma^2}}, \quad \sigma > 0,$$

with $E[\xi] = \mu$ and $\text{Var}[\xi] = \sigma^2$.

Gamma: $G(\alpha, \beta)$

$$f(\xi) = \frac{1}{\beta^\alpha \Gamma(\alpha)} \xi^{\alpha-1} e^{-\frac{\xi}{\beta}}, \quad \alpha > 0, \quad \beta > 0,$$

where $\Gamma(\alpha) = \int_0^\infty x^{\alpha-1} e^{-x} dx$, $\alpha > 0$, $E[\xi] = \alpha\beta$ and $\text{Var}[\xi] = \alpha\beta^2$.

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