MATH/STAT 3460, Intermediate Statistical Theory
WINTER 2014
Toby Kenney

Formula Sheet

Discrete Random Variables

Distribution	Parameters	$P(X=i)$	$E(X)$	$\mathrm{Var}(X)$	MLE
Binomial	n, p	$\binom{n}{i}p^i(1-p)^{n-i}$	np	$np(1-p)$	$\hat{p} = \frac{X}{n}$
Poisson	λ	$e^{-\lambda}\frac{\lambda^i}{i!}$	λ	λ	$\hat{p} = \frac{\sum X_i}{n}$

Continuous Random Variables

Distribution	Parameters	Probability density function	cumulative distribution function $F(x)$	$E(X)$	$\mathrm{Var}(X)$	MLE
Uniform	a, b	$\begin{cases} \frac{1}{b-a} & \text{if } a < b < x \\ 0 & \text{otherwise} \end{cases}$	$\begin{cases} 0 & x < a \\ \frac{x-a}{b-a} & a < b < x \\ 1 & x > b \end{cases}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	$\hat{a} = \min(X_i)$ $\hat{b} = \max(X_i)$
Normal	μ, σ^2	$\frac{1}{\sqrt{2\pi}\sigma}e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	$\Phi(x)$ (see table)	μ	σ^2	$\hat{\mu} = \overline{X} = \frac{\sum X_i}{n}$ $\hat{\sigma} = \frac{\sum(X_i-\mu)^2}{n} = \frac{\sum(X_i-\overline{X})^2}{n} + (\overline{X}-\mu)^2$
Exponential	λ	$\lambda e^{-\lambda x}$	$1 - e^{-\lambda x}$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$	$\hat{\lambda} = \frac{n}{\sum X_i}$