UU
ECE 3530

Probability Notation Compared

Descrip	Cotter	Notes	Walpole et al.	Definition
cumulative distribution	$F(x)$	$F(x)$	$F(x)$	$P\{X \le x\}$
probability	$P\{X = x\}$	$P\{X = x\}$	$P(X = x)$	Probability that $X = x$
density	$p(x)$	$p(x)$	$f(x)$	$\frac{d}{dx} P\{X = x\}$
joint density	$p(x,y)$	$p(x,y)$	$f(x,y)$	$\frac{d}{dx}\frac{d}{dy} P\{X = x \text{ and } Y = y\}$
marginal density of x	$p_X(x)$	$p_X(x)$	$g(x)$	$\int_{-\infty}^{\infty} p(x,y)dy$
marginal density of y	$p_Y(y)$	$p_Y(y)$	$h(y)$	$\int_{-\infty}^{\infty} p(x,y)dx$
conditional density	$p(y \mid X = x)$	$p_{Y \mid X=x}(y)$	$f(y \mid X = x)$	$\frac{p(x,y)}{p_X(x)} = \frac{p(x,y)}{\int_{-\infty}^{\infty} p(x,y)dy}$
mean	μ_X	μ_X	μ_X	$\int_{-\infty}^{\infty} x p_X(x)dx$
mean	$E\{X\}$	$E\{X\}$	$E(X)$	$\int_{-\infty}^{\infty} x p_X(x)dx$
mean	$E\{f(X,Y)\}$	$\mu_{f(x,y)}$	$E[g(X,Y)]$	$\int_{-\infty}^{\infty} f(x,y)p(x,y)dydx$
variance	σ_X^2	$E\{(X-\mu_X)^2\}$	σ_X^2	$E\{X^2\} - \mu_X^2$
variance	σ_{XX}	σ_{XX}	-	$E\{X^2\} - \mu_X^2$
covariance	σ_{XY}	$E\{(X-\mu_X)(Y-\mu_Y)\}$	σ_{XY}	$E\{XY\} - \mu_X\mu_Y$
variance	$\sigma_{f(X,Y)}^2$	$E\{(f(x,y)-\mu_{f(x,y)})^2\}$	$\sigma_{g(X,Y)}^2$	$E\{f^2(x,y)\} - \mu_{f(x,y)}^2$
correlation	ρ_{XY}	ρ_{XY}	ρ_{XY}	$\frac{\sigma_{XY}}{\sigma_X\sigma_Y}$