Queen Mary
University of London

B. Sc. Examination by course unit 2010

MTH6136 Statistical Theory

Duration: 2 hours

Date and time: possibly June 2010, 0h-0h

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Examiner(s): R. A. Sugden and L. I. Pettit

End of Paper

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DISCRETE AND CONTINUOUS DISTRIBUTIONS

discrete	**p.m.f.**	**range**	**parameters**	**mean**	**variance**	**p.g.f.**
BINOMIAL $Bi(k,p)$	$\binom{k}{x}p^x(1-p)^{k-x}$	$x=0,1,\ldots,k$	$0<p<1,\ k$ integer	kp	$kp(1-p)$	$[1-p+pz]^k$
POISSON $Po(\mu)$	$e^{-\mu}\mu^x/x!$	$x=0,1,\ldots$	$\mu>0$	μ	μ	$\exp[\mu(z-1)]$
GEOMETRIC $Ge(p)$	$p(1-p)^x$	$x=0,1,\ldots$	$0<p<1$	$(1-p)/p$	$(1-p)/p^2$	$p/(1-(1-p)z)$
NEG. BINOM. $NB(\alpha,p)$	$\frac{\Gamma(\alpha+x)}{\Gamma(\alpha)x!}p^\alpha(1-p)^x$	$x=0,1,\ldots$	$0<p<1,\ \alpha>0$	$\alpha(1-p)/p$	$\alpha(1-p)^2/p$	$[p/(1-z+pz)]^\alpha$

continuous	**p.d.f.**	**range**	**parameters**	**mean**	**variance**	**m.g.f.**
NORMAL $N(\mu,\sigma^2)$	$\frac{1}{\sigma\sqrt{2\pi}}\exp\left[-\frac{1}{2\sigma^2}(x-\mu)^2\right]$	$-\infty<x<\infty$	$-\infty<\mu<\infty,\ \sigma>0$	μ	σ^2	$\exp[s\mu+\sigma^2s^2/2]$
EXPONENTIAL $Ex(\lambda)$	$\lambda e^{-\lambda x}$	$x>0$	$\lambda>0$	$1/\lambda$	$1/\lambda^2$	$\lambda/(\lambda-s)$
GAMMA $Ga(\alpha,\lambda)$	$\lambda^\alpha x^{\alpha-1}e^{-\lambda x}/\Gamma(\alpha)$	$x>0$	$\lambda>0,\ \alpha>0$	α/λ	α/λ^2	$[\lambda/(\lambda-s)]^\alpha$
CHISQUARE χ^2_ν	$\equiv Ga(\frac{1}{2}\nu,\frac{1}{2})$		$\nu>0$	ν	2ν	$[1/(1-2s)]^{\frac{1}{2}\nu}$
UNIFORM $U(a,b)$	$1/(b-a)$	$a<x<b$	$-\infty<a<b<\infty$	$(a+b)/2$	$(b-a)^2/12$	$(e^{bs}-e^{as})/s$
BETA $Be(\alpha,\beta)$	$\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)}x^{\alpha-1}(1-x)^{\beta-1}$	$0<x<1$	$\alpha>0,\ \beta>0$	$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$	not useful
STUDENT'S t_ν	$\frac{\Gamma[(\nu+1)/2]}{\Gamma(\nu/2)\sqrt{\nu\pi}}(1+\frac{x^2}{\nu})^{-\frac{(\nu+1)}{2}}$	$-\infty<x<\infty$	$\nu>0$	$\mu=0,\ \nu>1$	$\frac{\nu}{\nu-2},\ \nu>2$	–

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