EDEXCEL FOUNDATION

Stewart House 32 Russell Square London WC1B 5DN

Jun 2002

Advanced Subsidiary /Advanced Level

General Certificate of Education

Subject STATISTICS 6684 Paper No. S2

Question number	Scheme		Marks
1. (a)	Collection / group / set of individuals or items		B1 (1)
(b)	A r.v. that is a function of known observations from a population		B1B1 (2)
(c)	College students. Mean approval rating of 75%		B1.B1 (2)
(d)	(*Probability) distribution* of all possible mean approval ratings of sample size 50	Dependent	B1 B1 (2)
			7
2.	$H_0 : \lambda = 2.5 ; H_1 : \lambda > 2.5$ (Accept $H_0 : \lambda = 10 ; H_1 : \lambda > 10$)		B1,B1
	1 week $X \sim Po(2.5)$, 4 weeks $X \sim Po(10)$	$Po(10)$	B1
	$P(X \geq 14) = 1 - 0.8645 = 0.1355$		M1A1
	Insufficient evidence to reject H_0		M1
	Sales have not increased after appointment of new salesman.	Context	A1ft
	[Note; P($X \leq 14$)=0.9165, P($X \leq 15$)=0.9153 for M1A1]		(7)
			7
3. (a)	X is no of passengers who do not turn up for this flight. $X \sim Bin(200, 0.03)$	both	M1 A1 (2)
(b)	$X \sim Po(6)$		B1
	$P(X < 4) = 0.1512$	Strict inequality, 0.1512	M1A1 (3)
(c)	$P(X > 4) = 1 - 0.2851 = 0.7149$		M1A1 (2)
	[Notes: (b)Use of N(6,5.82) B1 P(X<3.5)M1A0 (c) P(X>4.5)M1A0 (b) Use of N(6,6) B0 (b) Exact Bin no credit.]		7

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4.		
(a)	Continuous Uniform (Rectangular), $X \sim U[0,14]$	**B1,B1** (2)
(b)	$E(X)=\frac{(14+0)}{2}=7$ Form & sub, 7 Mean arrival time is 8.02am 8.02am	**M1A1** **A1** (3)
(c)	$P(X \leq x)=\int_0^x \frac{1}{14}dt=\frac{x}{14}$ Integral, $\frac{x}{14}$ $F(x)=\begin{cases}0 & x<0\\ \frac{x}{14} & 0\leq x\leq 14\\ 1 & x>14\end{cases}$ Centre Ends	**M1,A1** **B1ft** **B1**
(d)	$P(X>10)=1-F(10)$ Require '1 minus' or valid integral $=1-\frac{10}{14}=\frac{2}{7}$ $\frac{2}{7}$	**M1** **A1** (4)
		(2)

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Question number	Scheme		Marks
5.(a)	Failed connections occur singly, independently and at a constant rate of 3 per hour, randomly	Any two	**B1,B1** **(2)**
(b) (i)	X is no of failed connections every hour. $P(X=0)=0.0498$		**M1A1** **(2)**
(ii)	$P(X>4)=1-0.8153=0.1847$	Require '1 minus', 0.1847	**M1A1** **(2)**
(c)	$X \sim Po(24)$		**B1** **(1)**
(d)	Y is no of users that fail to connect at their first attempt		
	$Y \sim N(24,24)$	Normal, both	**B1,B1**
	$P(Y \geq 12)=1-P(Z<\frac{11.5-24}{\sqrt{24}})$	From above, all correct	**M1,A1**
	$=P(Z<-2.55)$	-2.55	**A1**
	$=0.9946$		**A1**
		13	**(6)**
6. (a)	$X \sim Bin(20,0.4)$	Bin, 20 & 0.4	**B1,B1** **(2)**
(b)	$P(5<X<15)=0.9984-0.1256$	≤14&≤5, Subtract, both correct	**M1,M1(dep)**
	$=0.8728$		**A1A1** **(4)**
(c)	$E(X)=20\times0.4=8$	8	**B1**
	$sd=\sqrt{20\times0.4\times0.6}=2.19$	Sub in $\sqrt{npq}$, 2.19	**M1,A1** **(3)**
(d)	$H_0: p=0.4$		
	$H_1: p>0.4$	Both	**B1**
	$P(X \geq 8 \mid n=10, p=0.4)=1-0.9877$	Require '1 minus'	**M1**
	$=0.0123$		**A1**
	Reject H_0		**M1**
	Proportion of diners who prefer to eat organic foods is higher than trade magazine's claim	Context	**A1ft**
	[Note; P(X≤6)=0.9452, P(X≤7)=0.9877 M1A1]		**(5)**
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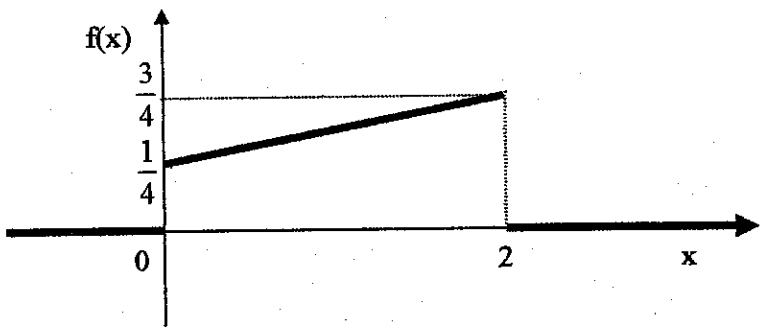
7. (a)	$8k=1, k=\frac{1}{8}$	cso	**B1** (1)
(b)	$F(m)=0.5$		**M1**
	$x^2+2x-4=0$		**A1**
	$x=\sqrt{5}-1=1.236$	awrt 1.24	**A1** (3)
(c)	$f(x)=\frac{1}{4}(x+1), \quad 0\le x\le 2$	Differentiation, all correct	**M1A1**
	$=0,$	otherwise 0 and ranges	**A1** (3)
(d)			**B1** vals& labels **B1** slope **B1** f(x)=0 (3)
(e)	mode= 2	2	**B1** (1)
(f)	$E(X)=\int_0^2 x(\frac{1}{4}(x+1))dx$	Attempt $\int_0^2 xf(x)dx$	**M1**
	$=\left[(\frac{1}{12}x^3+\frac{1}{8}x^2)\right]_0^2$	Expression all correct	**A1**
	$=\frac{7}{6}$		**A1** (3)
(g)	mean<median<mode ⇒ negative skew	Comparison, both	**M1A1** (2)

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