

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 $H_0: \lambda = 10; H_1: \lambda > 10$) 1 week $X \sim Po(2.5)$, 4 weeks $X \sim Po(10)$ $Po(10)$ $P(X \geq 14) = 1 - 0.8645 = 0.1355$ Insufficient evidence to reject H_0 Sales have not increased after appointment of new salesman. Context [Note; $P(X \leq 14) = 0.9165$, $P(X \leq 15) = 0.9153$ for M1A1]	B1,B1 B1 M1A1 M1 A1ft (7)
		7
3. (a)	X is no of passengers who do not turn up for this flight. $X \sim Bin(200, 0.03)$	M1 A1 both (2)
(b)	$X \sim Po(6)$ $P(X < 4) = 0.1512$	B1 M1A1 Strict inequality, 0.1512 (3)
(c)	$P(X > 4) = 1 - 0.2851 = 0.7149$ [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.]	M1A1 (2)
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Question number	Scheme	Marks
4.		
(a)	Continuous Uniform (Rectangular), $X \sim U[0,14]$	B1,B1 (2)
(b)	$E(X) = \frac{(14+0)}{2} = 7$ Mean arrival time is 8.02am	Form & sub, 7 8.02am M1A1 A1 (3)
(c)	$P(X \leq x) = \int_0^x \frac{1}{14} dt = \frac{x}{14}$ $F(x) = \begin{cases} 0 & x < 0 \\ \frac{x}{14} & 0 \leq x \leq 14 \\ 1 & x > 14 \end{cases}$	Integral, $\frac{x}{14}$ M1,A1 Centre Ends B1ft (3)
(d)	$P(X > 10) = 1 - F(10)$ $= 1 - \frac{10}{14} = \frac{2}{7}$	Require '1 minus' or valid integral $\frac{2}{7}$ M1 A1 (4)
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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
	$P(Y \geq 12) = 1 - P(Z < \frac{11.5 - 24}{\sqrt{24}})$ $= P(Z < -2.55)$ $= 0.9946$	From above, all correct -2.55 M1,A1 A1 A1
		13 (6)
6. (a)	$X \sim Bin(20, 0.4)$	Bin, 20 & 0.4 B1,B1 (2)
(b)	$P(5 < X < 15) = 0.9984 - 0.1256 = 0.8728$	$\leq 14 \& \leq 5$, Subtract, both correct M1,M1(dep) A1A1 (4)
(c)	$E(X) = 20 \times 0.4 = 8$ $sd = \sqrt{20 \times 0.4 \times 0.6} = 2.19$	8 B1 Sub in \sqrt{npq} , 2.19 M1,A1 (3)
(d)	$H_0: p = 0.4$ $H_1: p > 0.4$ $P(X \geq 8 n = 10, p = 0.4) = 1 - 0.9877 = 0.0123$ Reject H_0 Proportion of diners who prefer to eat organic foods is higher than trade magazine's claim [Note; $P(X \leq 6) = 0.9452$, $P(X \leq 7) = 0.9877$ M1A1]	Both B1 Require '1 minus' M1 A1 M1 Context A1ft
		14 (5)

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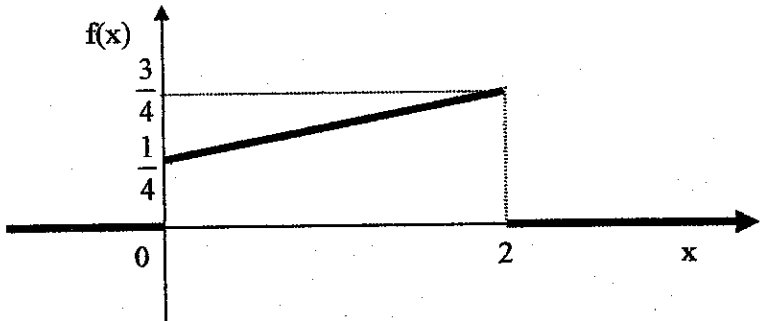
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7. (a)	$8k = 1, k = \frac{1}{8}$	cs0 B1 (1)
(b)	$F(m) = 0.5$ $x^2 + 2x - 4 = 0$ $x = \sqrt{5} - 1 = 1.236$	M1 A1 awrt 1.24 A1 (3)
(c)	$f(x) = \frac{1}{4}(x+1), \quad 0 \leq x \leq 2$ $= 0,$	Differentiation, all correct otherwise 0 and ranges M1A1 A1 (3)
(d)		B1 vals & labels B1 slope B1 $f(x) = 0$ (3)
(e)	mode = 2	2 B1 (1)
(f)	$E(X) = \int_0^2 x \left(\frac{1}{4}(x+1) \right) dx$ $= \left[\frac{1}{12}x^3 + \frac{1}{8}x^2 \right]_0^2$ $= \frac{7}{6}$	Attempt $\int_0^2 xf(x)dx$ M1 Expression all correct A1 A1 (3)
(g)	mean < median < mode \Rightarrow negative skew	Comparison, both M1A1 (2)