Edexcel GCE
Statistics S2
Gold Level G1
(Mark Scheme)

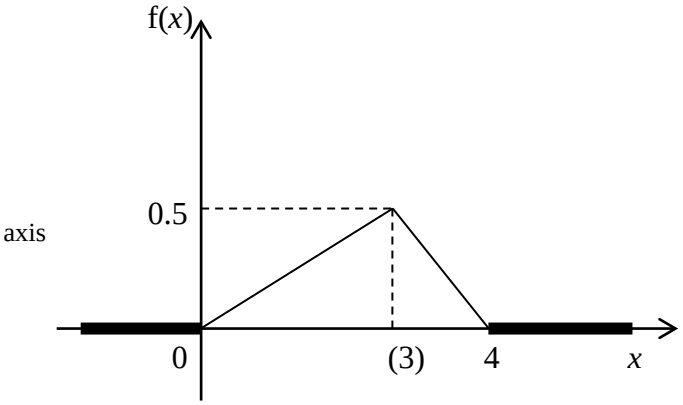
Mr.S.V.Swarnaraja (Marking Examiner, Team Leader & Author)
www.swanash.com, Mobile: +94777304755 , email: swa@swanash.com

Question Number	Scheme	Marks
1.		
(a)	A census is when <u>every member</u> of the <u>population</u> is investigated.	**B1**
(b)	There would be no cookers left to sell.	**B1**
(c)	A list of the unique identification numbers of the cookers.	**B1**
(d)	A cooker	**B1**
		(4)
2.	$H_0 : p = 0.5$	**B1**
	$H_1 : p > 0.5$	**B1**
	$X \sim B(30,0.5)$ Using correct Bin	**M1**
	$P(X \geq 21) = 1 - P(X \leq 20)$ or $P(X \leq 19) = 0.9506$ $P(X \geq 20) = 0.0494$	**M1**
	$= 1 - 0.9786$	
	$= 0.0214$ CR $X \geq 20$	**A1**
	so significant/reject H_0 /in Critical region	**M1 dep**
	Evidence to suggest **<u>David's claim is incorrect</u>** or The weather **<u>forecast</u>** produced by the local **<u>radio</u>** is better than those achieved by **<u>tossing/flipping a coin</u>**	**A1 (7)**
		(7 marks)
3.		
(a)	<u>Events</u> occur at a constant rate. any two of the 3 <u>Events</u> occur independently or randomly. <u>Events</u> occur singly.	**B1 B1 (2)**
(b)	Let X be the random variable the number of cars passing the observation point.	
(i)	Po(6)	**B1**
	$P(X \leq 4) - P(X \leq 3) = 0.2851 - 0.1512$ or $\frac{e^{-6}6^4}{4!}$	**M1**
	$= 0.1339$	**A1**
(ii)	$1 - P(X \leq 4) = 1 - 0.2851$ or $1 - e^{-6}\left(\frac{6^4}{4!} + \frac{6^3}{3!} + \frac{6^2}{2!} + \frac{6^4}{1!} + 1\right)$	**M1**
	$= 0.7149$	**A1**
		(5)
(c)	P (0 car and 1 others) + P (1 cars and 0 other)	**B1**
	$= e^{-1} \times 2e^{-2} + 1e^{-1} \times e^{-2}$	**M1 A1**
	$= 0.3679 \times 0.2707 + 0.3674 \times 0.1353$	
	$= 0.0996 + 0.0498$	
	$= 0.149$	**A1**
		(4)

Question Number	Scheme	Marks
4. (a)	Mean = 1	B1 **(1)**
(b)	$P(X \leq 2.4) = (2.4 - -4) \times \frac{1}{10}$	M1
	$= 0.64$ or $\frac{16}{25}$	A1
		(2)
(c)	$P(-3 < X - 5 < 3) = P(2 < X < 6)$	M1
	$= 0.4$	A1
		(2)
(d)	$\int_a^{4a} \frac{y^2}{4a-a} dy = \left[\frac{y^3}{9a}\right]_a^{4a}$	M1
		M1 dep
	$= \frac{64a^3 - a^3}{9a}$	A1
	$= 7a^2$ *AG	A1cso
		(4)
(e)	$\text{Var}(Y) = \frac{1}{12}(4a-a)^2$ or $\text{Var}(Y) = 7a^2 - \left(\frac{5}{2}a\right)^2$	M1
	$= \frac{3}{4}a^2$	A1cso
		(2)
(f)	$\frac{2}{3} = \frac{1}{3a}\left(\frac{8}{3} - a\right)$	M1
		A1
	$a = \frac{8}{9}$	A1
		(3)
		Total 14

Question Number	Scheme	Marks
5. (a) (i)	$H_0 : \lambda = 7$ $H_1 : \lambda > 7$	B1
	X = number of visits. $X \sim$ Po(7)	B1
	P ($X \geq 10$) = 1 - P($X \leq 9$) = 0.1695 1 - P($X \leq 10$) = 0.0985 1 - P($X \leq 9$) = 0.1695 CR $X \geq 11$	M1 A1
	0.1695 > 0.10 , CR $X \geq 11$ Not significant or it is not in the critical region or do not reject H_0 The rate of visits on a Saturday is not greater/ is unchanged	M1 A1 no ft
(ii)	$X = 11$	B1 (7)
(b)	(The visits occur) randomly/ independently or singly or constant rate	B1 (1)
(c)	[$H_0 : \lambda = 7$ $H_1 : \lambda > 7$ (or $H_0 : \lambda = 14$ $H_1 : \lambda > 14$)]	
	$X \sim$N;(14,14)	B1;B1
	P (X $\geq$ 20) = P $\left(z \geq \frac{19.5-14}{\sqrt{14}} \right)$ = P (z $\geq$ 1.47) = 0.0708 or z = 1.2816 +/- 0.5, stand	M1 M1 A1dep both M
	0.0708 < 0.10 therefore significant. The rate of visits is greater on a Saturday	A1dep 2nd M (6)

Question Number	Scheme	Marks
6. (a)	x | 1p | 2p $P(X=x)$ | $\frac{1}{4}$ | $\frac{3}{4}$	
	$\mu = 1\times\frac{1}{4}+2\times\frac{3}{4}=\frac{7}{4}$ or $1\frac{3}{4}$ or 1.75	B1
	$\sigma^2 = 1^2\times\frac{1}{4}+2^2\times\frac{3}{4}-\left(\frac{7}{4}\right)^2$	M1
	$=\frac{3}{16}$ or 0.1875	A1
		(3)
(b)	(1,1,1) , (1,1,2) any order, (1,2,2) any order, (2,2,2)	B1
	(1,2,1) (2,1,1) (2,1,2) (2,2,1) all 8 cases considered. May be implied by 3 * (1,1,2) and 3*(1,2,2)	B1
		(2)
(c)	$\bar{x}$ | 1 | $\frac{4}{3}$ | $\frac{5}{3}$ | 2 $P(\bar{X}=\bar{x})$ | $\frac{1}{4}\times\frac{1}{4}\times\frac{1}{4}=\frac{1}{64}$ | $3\times\frac{1}{4}\times\frac{1}{4}\times\frac{3}{4}=\frac{9}{64}$ | $3\times\frac{1}{4}\times\frac{3}{4}\times\frac{3}{4}=\frac{27}{64}$ | $\frac{3}{4}\times\frac{3}{4}\times\frac{3}{4}=\frac{27}{64}$	B1 M1 A1 M1 A1A1
		(6)
		Total [11]

Question Number	Scheme	Marks
7 (a)	 (0), 4, 0.5 0 may be implied by start at y both patio must be straight	B1 B1 B1 (3)
(b)	Mode is $x = 3$	B1 (1)
(c)	$F(x) = \int_0^x \frac{1}{6}t \text{ dt}$ (for $0 \le x \le 3$) ignore limits for M $= \frac{1}{12}x^2$ must use limit of 0 $F(x) = \int_3^x 2 - \frac{1}{2}t \text{ dt}; + \int_0^3 \frac{1}{6}t \text{ dt}$ (for $3 < x \le 4$) need limit of 3 and variable upper limit; need limit 0 and 3 $= 2x - \frac{1}{4}x^2 - 3$	M1 A1 M1; M1 A1
(d)	$F(x)\begin{cases} 0 & x < 0 \\ \frac{1}{12}x^2 & 0 \le x \le 3 \\ 2x - \frac{1}{4}x^2 - 3 & 3 < x \le 4 \\ 1 & x > 4 \end{cases}$ middle pair ends	B1 ft B1 (7)
	F(m) = 0.5 either eq $\frac{1}{12}x^2 = 0.5$ eq for their $0 \le x \le 3$ $x = \sqrt{6} = 2.45$ $\sqrt{6}$ or awrt 2.45	M1 A1ft A1 (3) Total 14

Statistics for S2 Practice Paper Gold 1

				Mean average scored by candidates achieving grade:							
Qu	**Max Score**	**Modal score**	**Mean %**	**ALL**	**A***	**A**	**B**	**C**	**D**	**E**	**U**
1	4		63.0	2.52		2.80	2.12	1.42	1.30	0.86	0.36
2	7		68.7	4.81	5.63	5.23	4.04	3.18	2.62	2.30	0.58
3	11		66.0	7.26		7.34	6.38	5.45	4.68	4.04	2.18
4	14	14	67.0	9.42	12.47	11.36	8.54	6.72	4.69	3.44	2.14
6	14		68.1	9.53		11.64	8.37	6.40	3.65	2.65	0.53
7	11		63.2	6.95		8.33	5.11	3.55	2.71	2.06	0.27
8	14		65.4	9.16		11.63	9.77	8.10	6.65	5.00	2.43
	75		**66.2**	**49.65**		**58.33**	**44.33**	**34.82**	**26.30**	**20.35**	**8.49**