

EDEXCEL PURE MATHEMATICS S1 (6683) - JANUARY 2003 PROVISIONAL MARK SCHEME

Question Number	Scheme	Marks
1.	Frequency densities: 0.16, 1.0, 1.0, 0.4, 0.4, 0.08 Histogram: Scale and labels Correct histogram	M1, A1 B1 B1 (4 marks)
2.	(a) $P(A \cap B) = \frac{10}{100} = \frac{1}{10} = 0.1$ (b) $P(A') = \frac{75}{100} = 0.75$ (c) $P(B' A) = \frac{P(B' \cap A)}{P(A)} = \frac{\frac{15}{100}}{\frac{25}{100}} = \frac{15}{25} = \frac{3}{5} = 0.6$ (d) $P(A' \cap B) = 0.4$; $P(A')P(B) = 0.75 \times 0.5 = 0.375$ Since $P(A' \cap B) \neq P(A')P(B) \Rightarrow$ not independent One of models is less reliable	M1 A1 (2) M1 A1 (2) M1 A1 (2) M1 A1 A1 (3) (9 marks)
3.	Let X represent amount dispersed into cups $\therefore X \sim N(55, \sigma)$ (a) $P(X < 50) = 0.10 \Rightarrow \frac{50 - 55}{\sigma} = -1.2816$ $\sigma = 3.90137$ (b) $P(X > 61) = P(Z > \frac{61 - 55}{3.90137...})$ $= P(Z > 1.54)$ $= 1 - 0.90382 = 0.0618$; 6.18% (c) Let Y represent new amount dispensed. $\therefore Y \sim N(\mu, 3)$ $P(Y < 50) = 0.025 \Rightarrow \frac{50 - \mu}{3} = -1.96$ $\mu = 55.88$	M1 B1 M1 A1 (4) M1 A1 A1 (3) M1 B1 M1 A1 (4) (11 marks)

EDEXCEL PURE MATHEMATICS S1 (6683) - JANUARY 2003 PROVISIONAL MARK SCHEME

Question Number	Scheme	Marks
4.	<p>(a) $Q_2 = \frac{16+16}{2} = 16$; $Q_1 = 15$; $Q_3 = 16.5$; IQR = 1.5</p> <p>(b) $1.5 \times \text{IQR} = 1.5 \times 1.5 = 2.25$ $Q_1 - 1.5 \times \text{IQR} = 12.75 \Rightarrow$ no outliers below Q_1 $Q_3 + 1.5 \times \text{IQR} = 18.75 \Rightarrow 25$ is an outlier Boxplot, label scale 14, 15, 16, 16.5, 18.75 (18) Outlier</p> <p>(c) $\bar{x} = \frac{322}{20} = 16.1$</p> <p>(d) Almost symmetrical/slight negative skew Mean (16.1) \approx Median (16) and $Q_3 - Q_2$ (0.5) \approx $Q_2 - Q_1$ (1.0)</p>	<p>M1A1; B1; B1; B1 (5) M1 A1 A1 A1 M1 A1 A1 (7) M1 A1 (2) B1 B1 (2) (16 marks)</p>
5.	<p>(a) $2k + k + 0 + k = 1$ $\therefore 4k = 1 \Rightarrow k = 0.25$ (★)</p> <p style="margin-left: 40px;">x 0 1 2 3</p> <p>(b) $P(X=x)$ 0.5 0.25 0 0.25 $xP(X=x)$ 0 0.25 0 0.75 $x^2P(X=x)$ 0 0.25 0 2.75 $E(X) = \sum xP(X=x) = 0 + 0.25 + 0 + 0.75 = 1$ $E(X^2) = 0 + 0.25 + 0 + 2.25 = 2.5$ (★)</p> <p>(c) $\text{Var}(3X - 2) = 3^2 \text{Var}(X)$ $= 9(2.5 - 1^2) = 13.5$</p> <p>(d) $P(X_1 + X_2) = P(X_1 = 3 \cap X_2 = 2) + P(X_1 = 2 \cap X_2 = 3) = 0 + 0 = 0$</p> <p>Let $Y = X_1 + X_2$ y 0 1 2 3 4 5 6</p> <p>(e) $P(Y=y)$ 0.25 0.25 0.0625 0.25 0.125 (0) 0.0625</p> <p>(f) $P(1.3 \leq X_1 + X_2 \leq 3.2) = P(X_1 + X_2 = 2) + P(X_1 + X_2 = 3)$ $= 0.0625 + 0.25 = 0.3125$</p>	<p>M1 A1 (2) M1 A1 M1 A1 (4) M1 M1 A1 (3) B1 (1) B1 B2 (3) M1 A1ft, A1ft (3) (16 marks)</p>

EDEXCEL PURE MATHEMATICS S1 (6683) - JANUARY 2003 PROVISIONAL MARK SCHEME

Question Number	Scheme	Marks
6.	<p>(a) x 20 26 32 34 37 44 48 50 53 58 y 24 38 42 44 43 52 59 66 70 79</p>	B1
	<p>Change in cost of advertising influences number of new car sales Graph: Scale and labels Points all correct</p>	B1 B1 B2
	<p>(b) $S_{xy} = 22611 - \frac{402 \times 517}{10} = 1827.6$</p>	(5) M1 A1
	<p>$S_{xx} = 17538 - \frac{402^2}{10} = 1377.6$</p>	A1
	<p>$b = \frac{S_{xy}}{S_{xx}} = \frac{1827.6}{1377.6} = 1.326655\dots$</p>	M1 A1
	<p>$a = \frac{517}{10} - (1.326655\dots) \times \frac{402}{10} = -1.63153\dots$</p>	B1
	<p>$\therefore y = -1.63 + 1.33x$</p>	B1ft (7)
	<p>(c) $\frac{c - 4000}{10} = -1.63 + 1.33(p - 100)$</p>	M1 A1ft
	<p>$c = 2653.7 + 13.3p$</p>	A1 (3)
	<p>(d) No. sold if no money spent on advertising</p>	B1
<p>$p = 0$ is well outside valid range – meaningless</p>	B1 (2)	
<p>(e) $2 \times 13.3 = 27$ extra cars sold Only valid in range of data for 1990s</p>	B1 (2) (19 marks)	