STATISTICS 1 (A) TEST PAPER 2 : ANSWERS AND MARK SCHEME

1. (a) A quantity which can take only certain distinct values,

with fixed probabilities   B1

(b)

x	0	1	2
$P(X=x)$	$\frac{1}{7}$	$\frac{4}{7}$	$\frac{2}{7}$

M1 A1 A1 A1

(c) (i) $E(X) = \frac{8}{7}$ (ii) $E(X^2) = \frac{12}{7}$ $Var(X) = \frac{12}{7} - \frac{64}{49} = \frac{20}{49}$ B1; M1 A1

(iii) $Var(2X) = 4\,Var(X) = \frac{80}{49}$ or 1·63 M1 A1 10

2. (a) $\frac{1}{8} + 9p + 26q = 4.5$, $\frac{1}{8} + 3p + 4q = 1$ M1 A1 B1

$9p + 26q = 4\cdot375$, $3p + 4q = 0\cdot875$ Solve : $p = q = \frac{1}{8}$ M1 M1 A1 A1

(b) Discrete uniform distribution B1

(c) $\frac{n^2 - 1}{12} = \frac{63}{12}$ s.d. = 2·29 M1 A1 A1 11

3. (a) $547 - 479 = 68$ B1

(b) $\sum x = 531$ B1

$S_{xx} = 5890\cdot8$, $S_{yy} = 1654\cdot1$, $S_{xy} = 2296\cdot3$ $r = 0\cdot736$ M1 A1 A1

(c) $y - 54\cdot7 = (2296\cdot3/5890\cdot8)(x - 53\cdot1) = 0\cdot3898x - 20\cdot699$ M1 A1

$y = 0\cdot390x + 34\cdot0$ M1 A1

(d) When $x = 70$, $y \approx 61\cdot3$ M1 A1

(e) Nor very reliable, as value of r shows only moderate correlation B1 B1 13

4. (a) $P(X < 2\mu) = P[Z < (2\mu - \mu)/(2\mu/3)] = P(Z < 1\cdot5) = 0\cdot933$ M1 A1 A1 M1 A1

(b) (i) $P(Z < 2\mu/\sigma) = 0\cdot86$ $2\mu/\sigma = 1\cdot08$ $\mu = 0\cdot54\sigma$ M1 A1 M1 A1

(ii) $P(X > 0) = P[Z > -\mu/(\mu/0\cdot54)] = P(Z > -0\cdot54) = 0\cdot705$ M1 M1 A1 A1 13

5. (a) A: Median = 33 $Q_1 = 26$ $Q_3 = 46$ B1 B1 B1

B: Median = 34 $Q_1 = 20$ $Q_3 = 49$ B1 B1 B1

(b) $0\cdot42 \times 30 = 12\cdot6$, so 13th value, 30 M1 A1

(c) Box plots drawn B2 B2

(d) A has positive skew, B is fairly symmetric B1 B1 14

6. (a) $P(A_2) = \frac{7}{30}$ B1

(b) $P(A_1 \cap B_1) = \frac{5}{30} \times \frac{8}{32} = \frac{1}{24}$ M1 A1 A1

(c) $P(B_5) = \left(\frac{3}{30} \times \frac{5}{32}\right) + \left(\frac{27}{30} \times \frac{4}{32}\right) = \frac{41}{320}$ $P(A_6 \mid B_5) = \frac{3}{30} \times \frac{4}{32} \div \frac{41}{320} = \frac{4}{41}$ M1 M1 A1 M1 A1

(d) $P(A_1 \cup B_3) = \frac{1}{6} + \left(\frac{7}{30} \times \frac{6}{32}\right) + \left(\frac{23}{30} \times \frac{5}{32}\right) = \frac{1}{6} + \frac{7}{160} + \frac{23}{192} = \frac{317}{960}$ or 0·330 M1 A1 M1 A1 A1 14