

STATISTICS 1 (A) TEST PAPER 6 : ANSWERS AND MARK SCHEME

1. (a) The set of all possible outcomes of an experiment B2
 (b) $f(x) \geq 0$ for all x , $\sum f(x) = 1$ B1 B1 4
2. For A , $P(X \geq 110) = P(Z > 1/8 \cdot 5) = P(Z > 0.118)$ M1 M1 A1
 For B , $P(X \geq 110) = P(Z > 1.5/13) = P(Z > 0.115)$ M1 M1 A1
 So B has greater probability of completing, equal to 0.454 M1 A1 8
3. (a) $0.6 = x + y - 0.2x$ $0.8x + y = 0.6$ $4x + 5y = 3$ M1 A1
 (b) $0.9 = y + (x + y)$ $x + 2y = 0.9$ Solve: $y = 0.2$, $x = 0.5$ M1 A1 M1 A1 (both)
 (c) $P(B|A) = P(B)$, so A and B are independent M1 A1 8
4. (a) $p^2 + p = 0.39$ $(p + 1.3)(p - 0.3) = 0$ $p = 0.3$ M1 A1 M1 A1
 (b) (i) $P(0 < X \leq 2) = 0.17 + 0.2 = 0.37$ B1
 (ii) $P(X \geq 3) = 0.13 + 0.3 + 0.09 = 0.52$ M1 A1
 (c) $E(X) = 0.17 + 0.4 + 0.39 + 1.2 + 0.45 = 2.61$ B1
 $E(X^2) = 9.19$ $\text{Var}(X) = 9.19 - 2.61^2 = 2.38$ M1 A1
 (d)

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|--------|------|------|------|------|------|---|
| x | 0 | 1 | 2 | 3 | 4 | 5 |
| $F(x)$ | 0.11 | 0.28 | 0.48 | 0.61 | 0.91 | 1 |

 B2 12
5. (a) $\sum y = 234$, $\sum y^2 = 7448$ B1 B1
 $S_{xx} = 1013.875$, $S_{yy} = 603.5$, $S_{xy} = 738.75$ $r = 0.944$ M1 A1 A1
 (b) $x - \frac{261}{8} = \frac{738.75}{603.5}(y - \frac{234}{8})$ $x = 1.22y - 3.18$ M1 M1 A1 A1
 (c) Approx. 52 (d) Quite good, as r is fairly close to 1 M1 A1; B1 B1 13
6. (a) Cumulative frequency graph B1
 (b) $Q_1 \approx 75\,000 + \frac{86}{228} \times 25\,000 = \text{£}82\,372$ M1 A1
 $Q_2 \approx 125\,000 + \frac{23}{78} \times 25\,000 = \text{£}134\,430$ M1 A1
 $Q_3 \approx 150\,000 + \frac{108}{163} \times 50\,000 = \text{£}183\,129$ M1 A1
 (c) $100\,000 + \frac{65}{109} \times 25\,000 = \text{£}114\,908$ M1 A1
 (d) Box plot drawn; upper limit $\text{£}732\,000$ B4
 (e) First town IQR = $\text{£}100\,757$ Second town has higher median and smaller IQR, so is more expensive overall and more consistent B1 B1 15
7. (a) $(n + 1)/2 = 10$ $n = 19$ $\text{Var}(X) = (19^2 - 1)/12 = 30$ M1 A1 M1 A1
 (b) $P(X = 4, 5 \text{ or } 6) = \frac{3}{19}$ (c) $E(Y) = 0$, $\text{Var}(Y) = 270$ M1 A1; B1 M1 A1
 (d) $k(2 + 3 + \dots + 20) = 1$ $209k = 1$ $k = \frac{1}{209}$ M1 A1 A1
 (e) $P(3 < X \leq 6) = f(4) + f(5) + f(6) = \frac{1}{209}(5 + 6 + 7) = \frac{18}{209}$ M1 A1 A1 15