

STATISTICS 1 (A) TEST PAPER 3 : ANSWERS AND MARK SCHEME

1. (a) A numerical quantity determined by the outcome of an experiment, taking different values with certain probabilities B2
- (b) (i) e.g. shoe size (ii) e.g. time, in s, to run a race B1 B1 4
2. (a) $3p + 0.79 = 1$ $3p = 0.21$ $p = 0.07$ M1 A1
- (b) $E(X) = 3.22$ $E(X + 2) = E(X) + 2 = 5.22$ M1 A1 M1 A1
- (c) $\text{Var}(X) = E(X^2) - 3.22^2 = 14.26 - 3.22^2 = 3.892$ M1 A1 A1
- $\text{Var}(3X - 1) = 9 \text{Var}(X) = 35.0$ M1 A1 11
3. (a) $S_{xx} = 4201$, $S_{yy} = 3588.2$, $S_{xy} = 3460$ $r = 0.891$ M1 A1 A1
- (b) $y - 8.7 = \frac{3460}{4201}(x - 10)$ $y = 0.824x + 0.464$ M1 M1 A1 A1
- (c) $q - 50 = 0.824(p - 30) + 0.464$ $q = 0.824p + 25.8$ M1 A1 A1
- (d) When $p = 46$, $q \approx 63.6$ Assumed these values of p and q are within or close to the range from which the data was collected M1 A1 B1 13
4. (a) $P(X > 200) = 0.01$ $\frac{200 - \mu}{\sigma} = 2.33$ $200 - \mu = 2.33\sigma$ M1 A1
- $P(X > 165) = 0.77$ $\frac{165 - \mu}{\sigma} = -0.74$ $165 - \mu = -0.74\sigma$ B1 M1 A1
- $3.07\sigma = 35$ $\sigma = 11.4$ $\mu = 173$, $\sigma^2 = 130$ M1 A1 A1 A1
- (b) $P(X < 158) = P(Z < -1.34) = 1 - 0.91$, so 9% are under 158 cm M1 A1 A1
- (c) Model may be affected by lack of very short individuals (e.g. children), etc. B2 14
5. (a) Stem-and-leaf diagram drawn M2 A1 (any one group)
- Totals in groups : 7, 8, 6, 7, 6, 9, 5, 5, 3, 3, 0, 0, 1 A1 A1 A1 A1 A1
- (b) $Q_1 = 14$ $Q_2 = 26$ $Q_3 = 35$ M1 A1 A1 A1
- (c) Box plot drawn Outlier at 69 B3 B1 16
6. (a) $\frac{r}{36} \times \frac{r-1}{35} = \frac{1}{3}$ $r(r-1) = 12 \times 35 = 420$ M1 A1 M1 A1
- (b) $r^2 - r - 420 = 0$ $(r-21)(r+20) = 0$ $r = 21$ M1 M1 A1
- (c) (i) $P(2 \text{ red}) = 3 \times \frac{21}{36} \times \frac{20}{35} \times \frac{15}{34} = \frac{15}{34}$ $P(3 \text{ red}) = \frac{21}{36} \times \frac{20}{35} \times \frac{19}{34} = \frac{19}{102}$ M1 A1 M1 A1
- $P(2 \text{ or } 3 \text{ red}) = \frac{15}{34} + \frac{19}{102} = \frac{32}{51}$ or 0.627 M1 A1
- (ii) $P(\text{first is red} \mid 2 \text{ or } 3 \text{ red}) = \left(2 \times \frac{5}{34} + \frac{19}{102}\right) \div \frac{32}{51} = \frac{49}{64}$ or 0.766 M1 A1 M1 A1 17