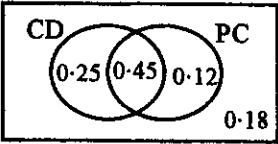# STATISTICS 1 (A) TEST PAPER 5 : ANSWERS AND MARK SCHEME

1. (a)   B1 B1 B1

    (b) $25\% + 18\% = 43\%$ M1 A1

    (c) $25\% + 12\% = 37\% = 0.37$ M1 A1   7

2. (a) 1.7 (b) $P(X < 0) = P(Z < -2/1.7) = P(Z < -1.176) = 0.12$ B1; M1 A1

    (c) $P(0.6 < X < 3.4) = P(-0.8235 < Z < 0.8235) = 2(0.294) = 0.588$ M1 A1 M1 A1   7

3. (a) $c(9 + 4 + 1 + 1 + 4 + 9) = 1$ $c = \frac{1}{28}$ M1 A1 A1

    (b) (i) $E(X) = 0$ (ii) $E(X^2) = (81 + 16 + 1 + 1 + 16 + 81)/28 = 7$ B1 M1 A1

    (c) (i) $Var(X) = 7$ (ii) $Var(10 - 2X) = 4\,Var(X) = 28$ B1 M1 A1   9

4. (a) $\sum h = 9.73$ $9.73 \div 8 = 1.22$ m   M1 A1

    (b) $\sum h^2 = 12.0319$ Var. $= 12.0319 \div 8 - 1.21625^2 = 0.0247$ B1 M1 A1

    (c) $S_{hh} = 0.1978$, $S_{ww} = 410$, $S_{hw} = 8.935$ $r = 0.992$ M1 A1 A1 A1

    (d) Shows strong positive correlation   B1   10

5. (a) $P(X < 60) = 0.15$ $(60 - \mu)/\sigma = -1.04$ $60 - \mu = -1.04\sigma$ M1 A1

    $P(X > 90) = 0.05$ $(90 - \mu)/\sigma = 1.65$ $90 - \mu = 1.65\sigma$ M1 A1

    $2.69\sigma = 30$ $\sigma = 11.2$, $\mu = 71.6$ M1 A1 A1

    (b) $P(X > 80) = P(Z > 0.75) = 0.227$ $0.227 \times 200 = 45$ M1 A1 A1   10

6. Let P = pass, F = fail, R = roadworthy (no faults), N = not roadworthy

    (a) $P(R) = P(P \cap R) + P(F \cap R) = 0.87 \times 0.98 + 0.13 \times 0.05 = 0.859$ M1 A1 M1 A1

    (b) $P(F \mid R) = (0.13 \times 0.05) \div 0.859 = 0.00757$ M1 M1 A1

    (c) Now $P(F \mid R) = 0.003$, so $P(F \cap R) = 0.003 \times P(R)$,   B1 B1

    and $P(R \mid F) = 0.01x$, so $P(F \cap R) = 0.0013x$ B1

    $0.0013x = 0.003(0.87 \times 0.98 + 0.0013x)$ M1 A1 A1

    $0.432x = 0.8526$ $x = 1.97$ M1 A1   15

7. (a) $5, 5, 4, 3$ B1

    (b) For A, median $= 51$, $Q_1 = 38$, $Q_3 = 63$ B1 B1 B1

    For B, median $= 44$, $Q_1 = 31$, $Q_3 = 63$ B1 B1 B1

    (c) Box plots drawn, with scale shown   B3 B3

    (d) A has higher average and smaller interquartile range, so A's times

    are higher overall but more consistent   B1 B1

    (e) A has slight negative skew, B has positive skew   B1 B1   17