

GCE Examinations

Advanced Subsidiary / Advanced Level

Statistics

Module S1

Paper D

MARKING GUIDE

This guide is intended to be as helpful as possible to teachers by providing concise solutions and indicating how marks should be awarded. There are obviously alternative methods that would also gain full marks.

Method marks (M) are awarded for knowing and using a method.

Accuracy marks (A) can only be awarded when a correct method has been used.

(B) marks are independent of method marks.

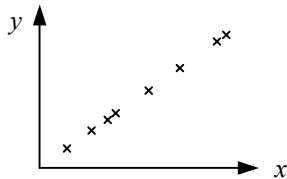
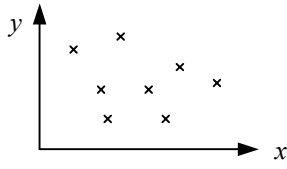


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S1 Paper D – Marking Guide

1. (a) (i) e.g.  B2
- (ii) e.g.  B2
- (b) e.g. with small n weak evidence of +ve correlation,
with larger n stronger evidence of +ve correlation B2 (6)
-
2. (a) f. d. of 30-34 = $\frac{32}{5} = 6.4$; $6.4 \rightarrow 19.2$ cm $\therefore 1 \rightarrow 3$ cm M1
f. d. of 35-39 = $\frac{28}{5} = 5.6$; \therefore height = $3 \times 5.6 = 16.8$ cm M1 A1
- (b) height 2.7 cm \therefore f. d. = $\frac{2.7}{3} = 0.9$ M1
 $\therefore \frac{n}{20} = 0.9$; $n = 18$ M1 A1 (6)
-
3. (a) $\frac{1}{4} = P(B) \times \frac{2}{3} \therefore P(B) = \frac{1}{4} \div \frac{2}{3} = \frac{3}{8}$ M2 A1
- (b) $\frac{7}{12} + \frac{3}{8} - \frac{1}{4} = \frac{17}{24}$ M2 A1
- (c) $P(B | A') = \frac{P(B \cap A')}{P(A')} = \frac{\frac{3}{8} - \frac{1}{4}}{1 - \frac{7}{12}} = \frac{3}{10}$ M2 A1 (9)
-
4. (a) $S_{xy} = 3871 - \frac{57 \times 2222}{20} = -2461.7$ M1
 $S_{xx} = 401 - \frac{57^2}{20} = 238.55$ M1
 $b = \frac{-2461.7}{238.55} = -10.3194$ M1 A1
 $a = \frac{2222}{20} - (-10.3194 \times \frac{57}{20}) = 140.5104$ M1 A1
 $y = 140.5104 - 10.3194x$ A1
 $P - 300 = 140.5104 - 10.3194(T - 20)$ M1
 $P = 646.9 - 10.3T$ A1
- (b) $460 = 646.9 - 10.3T$ M1
 $T = \frac{646.9 - 460}{10.3} = 18.1 \therefore 18^\circ\text{C}$ (nearest degree) M1 A1 (12)
-

5. (a) $2k + 3k + 4k + 5k + 6k = 1; k = \frac{1}{20}$ M1 A1
 (b) $\sum xP(x) = \frac{1}{20}(4 + 9 + 16 + 25 + 36) = \frac{9}{2}$ M2 A1
 (c) $= P(X > \frac{9}{2}) = \frac{5}{20} + \frac{6}{20} = \frac{11}{20}$ M1 A1
 (d) $(2 \times \frac{9}{2}) - 5 = 4$ M1 A1
 (e) $E(X^2) = \sum x^2P(x) = \frac{1}{20}(8 + 27 + 64 + 125 + 216) = 22$ M1 A1
 $\text{Var}(X) = 22 - (\frac{9}{2})^2 = \frac{7}{4}$ M1 A1 **(13)**

6. (a) $P(X > 2) = 0.75; P(Z > \frac{2-\mu}{\sigma}) = 0.75$ M2
 $\frac{2-\mu}{\sigma} = -0.67; 2 - \mu = -0.67\sigma$ A1
 $P(X > 6) = 0.1; P(Z > \frac{6-\mu}{\sigma}) = 0.1$ M2
 $\frac{6-\mu}{\sigma} = 1.2816; 6 - \mu = 1.2816\sigma$ A1
 solve simul. giving $\mu = 3.3732, \sigma = 2.0496$; so $\mu = 3.37, \sigma = 2.05$ M1 A2
 (b) $P(X < 1) = P(Z < \frac{1-3.3732}{2.0496}) = P(Z < -1.16) = 0.1230 \therefore 12.3\%$ M2 A1
 (c) e.g. large discrepancy between predicted & actual \therefore not v. suitable B2 **(14)**

7. (a)
- | Number of points | (2 4 means 24 points) | Totals |
|------------------|-------------------------|--------|
| 1 | 2 | (1) |
| 1 | 5 5 7 8 8 9 9 | (7) |
| 2 | 1 1 3 3 4 4 4 4 | (8) |
| 2 | 5 6 8 9 | (4) |
| 3 | 0 2 4 | (3) |
| 3 | 6 7 9 | (3) |
| 4 | 0 1 3 | (3) |
| 4 | 5 | (1) |
- B3
- (b) $Q_1 = 19$ A1
 $Q_2 = 24$ A1
 $Q_3 = 34 + \frac{1}{4}(36 - 34) = 34.5$ M1 A1
- (c)
-
- B3
- (d)
-
- B2
- (e) e.g. Tahira more points on av.; Tahira more consistent (smaller IQR); Jane sometimes v. high i.e. +ve skew whereas Tahira symm. B3 **(15)**

Total **(75)**

