

## STATISTICS 1 (A) TEST PAPER 4 : ANSWERS AND MARK SCHEME

1. (a) All cards are equally likely to be drawn B1  
 (b)  $E(X) = 31$        $\text{Var } X = 4 \times \frac{30^2 - 1}{12} = 299\frac{2}{3}$  M1 A1 M1 A1 A1 6
2. (a) Frequency density may not be greatest in that class B2  
 (b) 1000 families : 50 cm<sup>2</sup>, so 400 families : 20 cm<sup>2</sup> M1  
 Width of '30 - 40' = 2.5 cm, so width of '15 - 20' = 1.25 cm M1 A1 A1  
 Area of '15 - 20' = 15 cm<sup>2</sup>, so height =  $15 \div 1.25 = 12$  cm B1 M1 A1 9
3. (a)  $M = (94 + 106) \div 2 = 100$  B1  
 (b)  $y$  values : -20, -17, -12, -10, -3, 3, 5, 8, 12, 20 B1  
 $E(Y) = -1.4$ , so  $E(X) = 2(-1.4) + 100 = 97.2$  M1 A1  
 s.d. of  $Y = \sqrt{156.44} = 12.5$ , so s.d. of  $X = 25.0$  M1 A1 A1  
 (c)  $E(3X - 5) = 3(97.2) - 5 = 286.6$  M1 A1 A1 10
4. (a)  $k(1 + 2 + \dots + 8) = 1$        $36k = 1$        $k = \frac{1}{36}$  M1 M1 A1  
 (b)  $P(X < 0) = \frac{6}{36} - \frac{1}{6}$  M1 A1  
 (c)  $F(X) = \frac{1}{36} + \frac{2}{36} + \dots + \frac{x+4}{36} = \frac{1}{36}(1 + 2 + \dots [x + 4])$  M1 A1  
 $= \frac{1}{2} \times \frac{1}{36}(x + 4)([x + 4] + 1) = \frac{1}{72}(x + 4)(x + 5)$  M1 M1 A1 A1 11
5. (a)  $0.88 = P(A) + 0.52 - 0.24$        $P(A) = 0.6$  M1 A1 A1  
 (b) (i) No :  $P(A \cap B) \neq 0$       (ii) No :  $0.6 \times 0.52 \neq 0.24$  M1 A1 M1 A1  
 (c)  $P(B|A) = 0.24 \div 0.6 = 0.4$  M1 A1  
 (d)  $P(A'|B') = P(A' \cap B') / P(B') = 0.12 \div 0.48 = 0.25$  M1 A1 A1 12
6. (a)  $P(5 < X < 9) = P(-1.5 < Z < 0.5) = 0.6915 - 0.0668 = 0.625$  M1 A1 M1 A1  
 (b) Need  $P(X < k) = 0.9$ , so  $(k - 8)/2 = 1.28$        $k = 10.56$  B1 M1 A1  
 Range is 5.4 hours to 10.6 hours A1 A1  
 (c) If  $P(X > 5) = 0.8$ ,  $(5 - 8)/\sigma = -0.84$        $\sigma = 3.57$  M1 A1 A1 12
7. (a)  $S_{yy} = 109.177$ ,       $S_{xy} = -16.298$  B1 B1  
 $x - \frac{12.905}{7} = \frac{16.298}{109.177}(y - \frac{108.2}{7})$  M1 A1  
 $x - 1.84357 = -0.14928(y - 15.4571)$        $x = -0.149y + 4.15$  M1 A1  
 (b)  $S_{xx} = 3.1038$        $r = -0.885$       Quite good negative correlation M1 A1 A1 B1  
 (c)  $y = 12$  gives  $x \approx 2.36$       Not necessarily accurate - M1 A1  
 $n$  is small, which reduces significance of strong correlation B1  
 (d) When  $y$  is close to 0,  $x$  tends to 4.15, suggesting that a 4.15 litre B1  
 car would travel no km on any amount of fuel - meaningless B1 15