

Mark Scheme 4732
June 2005

Note: “(3 sfs)” means “answer which rounds to ... to 3 sfs”. If correct ans seen to ≥ 3 sfs, ISW for later rounding

<p>1 (i) Σd^2 $= 14$ $1 - \frac{6 \times \text{their } 14}{5 \times (25 - 1)}$ $= 0.3$</p>	<p>M1 A1 M1 A1</p>	<p>Subtr & squ 5 pairs & add dep 1stM1 $S_{xy} = 48 - \frac{15 \times 15}{5}$ } { = 3 } $S_{xx} = 55 - \frac{15^2}{5}$ } { = 10 } $S_{yy} = 55 - \frac{15^2}{5}$ } { = 10 } their $\frac{S_{xy}}{\sqrt{(S_{xx}S_{yy})}}$ M1dep = 0.3 A1</p>
<p>(ii) Reverse rankings attempted 2 5 3 4 1</p>	<p>M1 A1</p>	<p>3 correct T & I to make $\Sigma d^2 = 40$: 2 mks or 0 mks</p>
6		
<p>2 (i) (a) Geo(0.14) stated in (a) or (b) $(0.86)^4 \times 0.14$ $= 0.0766$ (3 sfs)</p>	<p>B1 M1 A1</p>	<p>or $0.86^n \times 0.14$ or $0.14^n \times 0.86$ in (a) or $\geq M1$ in (b) or Geo(0.86) stated in (a) or (b) No wking: 0.077: B1M1A0</p>
<p>(b) $1 - 0.86^7$ or $0.14 + 0.86 \times 0.14 + \dots + 0.86^6 \times 0.14$ $= 0.652$ (3 sfs)</p>	<p>M2 A1</p>	<p>$1 - 0.86^8$: M1 +8th term ($r = 7$ or 0) or 1 missing term: M1</p>
<p>(ii) $1/0.14$ $= {}^{50}/_7$ or 7.14 (3 sfs)</p>	<p>M1 A1</p>	<p>2</p>
8		
<p>3 (i) (a) B(16, 0.35) stated $1 - 0.8406$ $= 0.159$ (3 sfs)</p>	<p>B1 M1 A1</p>	<p>Or implied by use of tables or $0.35^a \times 0.65^b$ ($a+b = 16$) in (a) or (b) Allow $1 - 0.9329$ or 0.0671 Or complete method using formula, $P(r = 8-16$ or $9-16)$ or $1 - P(r = 0-7$ or $0-8)$</p>
<p>(b) $0.9771 - 0.1339$ $= 0.843$ (3 sfs)</p>	<p>M1 A1</p>	<p>Allow $0.9771 - 0.2892$ Or complete method using formula ($r = 4-9$)</p>
<p>(ii) ${}^{16}C_6(0.38)^6(0.62)^{10}$ $= 0.202$ (3 sfs)</p>	<p>M2 A1</p>	<p>Absent or incorr coeff : M1 or ${}^{16}C_6(0.38)^{10}(0.62)^6$: M1</p>
8		
<p>4 (i) Correct subst in \geq two S formulae $\frac{14464.1 - \frac{265 \times 274.6}{5}}{\sqrt{\left(14176.54 - \frac{265^2}{5}\right)\left(15162.22 - \frac{274.6^2}{5}\right)}}$ $= -0.868$ (3 sfs)</p>	<p>M1 M1 A1</p>	<p>Any correct version or $\frac{14464.1 - 5 \times 53 \times 54.92}{\sqrt{(14176.54 - 5 \times 53^2)(15162.22 - 5 \times 54.92^2)}}$ or fully correct method with $(x - \bar{x})^2$ etc</p>
<p>(ii) No difference oe</p>	<p>B1</p>	<p>1 Or slightly diff or more acc because of rounding errors when mult by 2.54 oe Not just “more accurate”</p>
<p>(iii) Choose y on x stated</p>	<p>B1ind</p>	<p>or implied, eg by S_{xy}/S_{xx} or $y = ax + b$</p>

$\frac{14464.1 - \frac{265 \times 274.6}{5}}{14176.54 - \frac{265^2}{5}} \quad \text{or } -0.682$ $y - \frac{274.6}{5} = (\text{their } -0.682)(x - \frac{265}{5})$ $y = 91(1) - 0.68(2)x$ <p>49.9 (3sfs) or 50</p>	<p>M1</p> <p>M1ind A1</p> <p>A1</p> <p style="text-align: right;">5</p>	<p>If state x on y, but wking is y on x: B1</p> <p>or their $\frac{-89.7}{131.54}$ seen or $\frac{14464.1 - 5 \times 53 \times 54.92}{14176.54 - 5 \times 53^2}$</p> <p>or correct subst into a correct formula $\frac{S_{xy}}{S_{xx}}$</p> <p>or $a = \frac{274.6}{5} - (\text{their } -0.682) \times \frac{265}{5}$</p> <p>Simplif to 3 terms. Coeffs to ≥ 2 sfs</p> <p>cao</p> <p>Use of x on y: equiv M mks as above</p>
9		
<p>5 (i) Read at 300 or 300.25 and 900 or 900.75 44.5 to 45.5 and 69 to 69.9 IQR 23.5 to 25.4</p>	<p>M1 A1 A1</p> <p style="text-align: right;">3</p>	<p>or 44-46 and 68-70 incl.</p> <p>dep A1 Must look back, see method. No wking, ans in range: M1A1A1</p>
<p>(ii) 0.6 or 60% CF 720 63 to 64</p>	<p>M1 M1 A1</p> <p style="text-align: right;">3</p>	<p>Seen or implied Seen or implied</p> <p>55.5 to 56: SC B1</p>
<p>(iii) 1200 – 860 = 340</p>	<p>M1 A1</p> <p style="text-align: right;">2</p>	<p>Allow 1200 – (850 to 890) 310 to 350</p>
<p>(iv) 340/1200 0.283^5 = 0.00183</p>	<p>M1 M1dep A1</p> <p style="text-align: right;">3</p>	<p>their (iii)/1200 [their (iii)/1200]⁵ exactly Allow 0.00114 to 0.00212 ≥ 2 sfs</p>
<p>(v) Incorrect reason or ambiguity: BOB0. Otherwise: Too low, or should be 26 or 27 or 2 or 3 higher</p>	<p>B2</p> <p style="text-align: right;">2</p>	<p>${}^{340}C_5 / {}^{1200}C_5$ M1 eg IQR = 55–35 = 20 or IQR = value >27</p> <p>or new info' implies straight line: B1 or originally, majority in range 35 – 55 are at top of</p> <p style="text-align: right;">this range: B1</p>
13		
<p>6 (i) $a = \frac{4}{5}, b = \frac{1}{5}$ $c = \frac{1}{4}, d = \frac{3}{4}$ $e = \frac{3}{4}, f = \frac{1}{4}$</p>	<p>B1 B1B1 B1</p> <p style="text-align: right;">4</p>	<p>Or : B1 { ie: a, b : B1 B1 { another pair : B1B1 B1B1 { third pair : B1</p>
<p>(ii) $\frac{1}{2}x^{\frac{4}{5}}x^{\frac{1}{2}} + \frac{1}{2}x^{\frac{1}{5}}x^{\frac{1}{4}} + \frac{1}{2}x^{\frac{3}{5}}x^{\frac{3}{4}}$ = $\frac{9}{20}$ (AG) with no errors seen</p>	<p>M2 A1</p> <p style="text-align: right;">3</p>	<p>M1: one correct product (M2 needs +) ft their values for M mks only</p>
<p>(iii) $\frac{1}{10} + \frac{9}{20} + k + \frac{1}{5} = 1$ oe or $\frac{1}{2}x^{\frac{1}{5}}x^{\frac{3}{4}} + \frac{1}{2}x^{\frac{3}{5}}x^{\frac{1}{4}} + \frac{1}{2}x^{\frac{2}{5}}x^{\frac{1}{2}}$ $k = \frac{1}{4}$ oe</p>	<p>M1 A1</p> <p style="text-align: right;">2</p>	<p>ft their values for M mk only</p>
<p>(iv) $\sum xp(x)$ = $1 \frac{3}{4}$ oe</p> <p>$\sum x^2p(x)$ [= $3 \frac{17}{20}$] $\sum x^2p(x) - (\text{their } \mu)^2$ 63/80 or 0.788 (3 sfs)</p>	<p>M1 A1</p> <p>M1 M1ind A1</p> <p style="text-align: right;">5</p>	<p>Allow omit 1st term only. Not ISW, eg $\div 4$ cao</p> <p>Allow omit 1st term only. Not ISW, eg $\div 4$ Subtract (their μ)², if result +ve Follow their k for M mks only</p> <p>$\Sigma(x - \mu)^2p(x)$: Single consistent pair: M1 Rest correct : M1</p>
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<p>7 (i) ${}^{18}C_7$ or $\frac{18!}{(11! \times 7!)}$ $= 31824$</p>	<p>M1 A1</p>	<p>2 cao</p>
<p>(ii) ${}^5C_2 \times {}^6C_2 \times {}^7C_3$ or 5250 $\div 31824$ $= 875/5304$ or $5250/31824$ oe or 0.165 (3 sfs)</p>	<p>M2 M1 A1</p>	<p>4 M1: 1 correct nC_r or mult any three nC_rs Divide by their (i). Indep If cancelled, must be clear have $\div 31824$ <hr/> $\frac{5 \times 4 \times 6 \times 5 \times 7 \times 6 \times 5 \times 7!}{18 \times 17 \times 16 \times 15 \times 14 \times 13 \times 12 \times 2!^2 \times 3!}$ Correct 7 fractions mult: M1 x 7!: M1 } $\div (2!^2 \times 3!)$: M1 } both dep any 7 fract mult</p>
<p>(iii) 5 from W & 2 from (G + H) ${}^7C_5 \times {}^{11}C_2$ or 1155 $\div 31824$ $= 385/10608$ or $1155/31824$ oe or 0.0363 (3 sfs)</p>	<p>M1 M1 M1 A1</p>	<p>4 Seen or implied, eg by combs or list Divide by their (i). Indep <hr/> $\frac{7 \times 6 \times 5 \times 4 \times 3 \times 11 \times 10 \times 7!}{18 \times 17 \times 16 \times 15 \times 14 \times 13 \times 12 \times 5! \times 2!}$ Correct 7 fractions mult: M1 x 7!: M1 } $\div (5! \times 2!)$: M1 } both dep any 7 fract mult</p>
<p>(iv) (2, 2, 3) or (2, 3, 2) or (3, 2, 2) ${}^5C_2 \times {}^6C_2 \times {}^7C_3 + {}^5C_2 \times {}^6C_3 \times {}^7C_2$ $+ {}^5C_3 \times {}^6C_2 \times {}^7C_2$ $(\div 31824)$ $= 175/442$ or $12600/31824$ oe or 0.396 (3 sfs)</p>	<p>M1 M2 A1</p>	<p>4 Any one. Seen or implied eg by combs M1: one correct product. NOT ${}^5C_2 \times {}^6C_2 \times {}^7C_2$ (No mk for $\div 31824$) Equiv method; ((ii) + etc) can imply M mks <hr/> $\frac{5 \times 4 \times 6 \times 5 \times 7 \times 6 \times 7!}{18 \times 17 \times 16 \times 15 \times 14 \times 13 \times 2!^2 \times 3!}$ Correct 6 fractions mult: M1 x 7!: M1 } $\div (2!^2 \times 3!)$: M1 } both dep any 6 fract mult Complement method: Triple with total 7, incl at least one 0 or 1 or (0, 7) or (1, 6) seen or implied: M1 One correct prod seen, eg ${}^5C_0 \times {}^6C_2 \times {}^7C_5$ M1 Full correct method, incl "1 –" M1</p>
	<p>14</p>	