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

1 (i) Σd^2 = 14 $1 - \frac{6 \times \textit{their}\ 14}{5 \times (25-1)}$ = 0.3	M1 A1 M1 A1	4	Subtr & squ 5 pairs & add dep 1st M1
			$S_{xy} = 48 - \frac{15 \times 15}{5}$ { = 3 } $S_{xx} = 55 - \frac{15^2}{5}$ { = 10 } M1 { } A1 $S_{yy} = 55 - \frac{15^2}{5}$ { = 10 } their $\frac{S_{xy}}{\sqrt{(S_{xx}S_{yy})}}$ M1dep = 0.3 A1
(ii) Reverse rankings attempted 2 5 4 1	M1 A1	2	3 correct T & 1 to make Σd^2 = 40: 2 mks or 0 mks
	6		
2 (i) (a) Geo(0.14) stated in (a) or (b) $(0.86)^4 \times 0.14$ = 0.0766 (3 sfs)	B1 M1 A1	3	or $0.86^n \times 0.14$ or $0.14^n \times 0.86$ in (a) or ≥ M1 in (b) or Geo(0.86) stated in (a) or (b) No wking: 0.077: B1M1A0
(b) $1 - 0.86^7$ or $0.14 + 0.86 \times 0.14 \ldots 0.86^6 \times 0.14$ = 0.652 (3 sfs)	M2 A1	3	$1 - 0.86^8$: M1 8^{th} term (r = 7 or 0) or 1 missing term: M1
(ii) 1/0.14 = $^{50}/_7$ or 7.14 (3 sfs)	M1 A1	2	
	8		
3 (i) (a) B(16, 0.35) stated 1 – 0.8406 = 0.159 (3 sfs)	B1 M1 A1	3	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)
(b) 0.9771 – 0.1339 = 0.843 (3 sfs)	M1 A1	2	Allow 0.9771 – 0.2892 Or complete method using formula (r = 4-9)
(ii) $^{16}C_6(0.38)^6(0.62)^{10}$ = 0.202 (3 sfs)	M2 A1	3	Absent or incorr coeff : M1 or $^{16}C_6(0.38)^{10}(0.62)^6$: M1
	8		
4 (i) Correct subst in ≥ 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)	M1 A1	3	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
(ii) No difference oe	B1	1	Or slightly diff or more acc because of rounding errors when mult by 2.54 oe Not just "more accurate"
(iii) Choose y on x stated	B1ind		or implied, eg by S_{xy}/S_{xx} or $y = ax + b$

$\frac{14464.1 - \frac{265 \times 274.6}{5}}{14176.54 - \frac{265^2}{5}}$ or –0.682 $y - {}^{274.6}/_5 = (\text{their} - 0.682)(x - {}^{265}/_5)$ $y = 91(.1) - 0.68(2)x$ 49.9 (3sfs) or 50	M1 M1ind A1 A1	5	If state x on y, but wking is y on x: B1 or their $\frac{-89.7}{131.54}$ seen or $\frac{14464.1 - 5 \times 53 \times 54.92}{14176.54 - 5 \times 53^2}$ or correct subst into a correct formula $\frac{S_{xy}}{S_{xx}}$ or $a = {}^{274.6}/_5$ - (their – 0.682) x ${}^{265}/_5$ Simplif to 3 terms. Coeffs to ≥ 2 sfs cao Use of x on y: equiv M mks as above
	9		
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	M1 A1 A1	3	or 44-46 and 68-70 incl. dep A1 Must look back, see method. No wking, ans in range: M1A1A1
(ii) 0.6 or 60% CF 720 63 to 64	M1 M1 A1	3	Seen or implied Seen or implied 55.5 to 56: SC B1
(iii) 1200 – 860 = 340	M1 A1	2	Allow 1200 – (850 to 890) 310 to 350
(iv) 340/1200 0.283^5 = 0.00183	M1 M1dep A1	3	their (iii)/1200 [their (iii)/1200]^5 exactly Allow 0.00114 to 0.00212 ≥ 2 sfs
			$^{340}C_5/^{1200}C_5$ M1
(v) Incorrect reason or ambiguity: B0B0. Otherwise: Too low, or should be 26 or 27 or 2 or 3 higher	B2	2	eg IQR = 55–35 = 20 or IQR = value >27 or new info' implies straight line: B1 or originally, majority in range 35 – 55 are at top of this range: B1
	13		
6 (i) $a = {}^4/_5$, $b = {}^1/_5$ $c = {}^1/_4$, $d = {}^3/_4$ $e = {}^3/_4$, $f = {}^1/_4$	B1 B1B1 B1	4	Or : B1 { ie: a, b : B1 B1 { another pair : B1B1 B1B1 { third pair : B1
(ii) ${}^1/_2 \times {}^4/_5 \times {}^1/_2 + {}^1/_2 \times {}^1/_5 \times {}^1/_4 + {}^1/_2 \times {}^3/_5 \times {}^3/_4$ = $\frac{9}{20}$ (**AG**) with no errors seen	M2 A1	3	M1: one correct product (M2 needs +) ft their values for M mks only
(iii) 1/10 + 9/20 + k + 1/5 = 1 oe or ${}^1/_2 \times {}^1/_5 \times {}^3/_4 + {}^1/_2 \times {}^3/_5 \times {}^1/_4 + {}^1/_2 \times {}^3/_5 \times {}^1/_2$ k = ¼ oe	M1 A1	2	ft their values for M mk only
(iv) $\Sigma xp(x)$ = $1\frac{3}{4}$ oe $\Sigma x^2p(x)$ [= $3\frac{17}{20}$] $\Sigma x^2p(x) - (\text{their } \mu)^2$ 63/80 or 0.788 (3 sfs)	M1 A1 M1 M1ind A1	5	Allow omit 1st term only. Not ISW, eg + 4 cao Allow omit 1st term only. Not ISW, eg + 4 Subtract (their μ)^2, if result +ve Follow their k for M mks only $\Sigma(x - \mu)^2p(x)$: Single consistent pair: M1 Rest correct : M1
	14		

7 (i) ${}^{18}C_7$ or $\frac{18!}{(11!\times 7!)}$ = 31824	M1 A1	2	cao
(ii) ${}^5C_2 \times {}^6C_2 \times {}^7C_3$ or 5250 ÷ 31824 = 875/5304 or 5250/31824 oe or 0.165 (3 sfs)	M2 M1 A1	4	M1: 1 correct ${}^nC_r$ or mult any three ${}^nC_r$s Divide by their (i). Indep If cancelled, must be clear have ÷ 31824
			$\frac{5\times4\times6\times5\times7\times6\times5\times7!}{18\times17\times16\times15\times14\times13\times12\times2!^2\times3!}$ Correct 7 fractions mult: M1 x7!: M1} ÷ $(2!^2\times3!)$: M1}both dep any 7 fracts mult
(iii) 5 from W & 2 from (G + H) ${}^7C_5 \times {}^{11}C_2$ or 1155 ÷ 31824 = 385/10608 or 1155/31824 oe or 0.0363 (3 sfs)	M1 M1 M1 A1	4	Seen or implied, eg by combs or list Divide by their (i). Indep
			$\frac{7\times6\times5\times4\times3\times11\times10\times7!}{18\times17\times16\times15\times14\times13\times12\times5!\times2!}$ Correct 7 fractions mult: M1 x 7! : M1} ÷ (5! x 2!): M1} both dep any 7 fracts mult
(iv) (2, 2, 3) or (2, 3, 2) or (3, 2, 2) ${}^5C_2\times{}^6C_2\times{}^7C_3+{}^5C_2\times{}^6C_3\times{}^7C_2$ $+{}^5C_3\times{}^6C_2\times{}^7C_2$ (÷ 31824) = 175/442 or 12600/31824 oe or 0.396 (3 sfs)	M1 M2 A1	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 ÷ 31824) ~~Equiv method, ((ii) + etc) can imply M mks~~
			$\frac{5\times4\times6\times5\times7\times6\times7!}{18\times17\times16\times15\times14\times13\times2!^5\times3!}$ Correct 6 fractions mult: M1 x 7! : M1} ÷ $(2!^2\times3!)$: M1}both dep any 6 fracts 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
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Probability & Statistics 1.

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Mark Scheme ~~4733~~
June 2005