Final draft

1	(i)	*A* Points lie close to straight line	B1 B1 2		Valid reason, eg "linear". Not "strong correlation"
	(ii)	*C* Non-linear relationship	B1 B1 2		eg curve or quadratic
2	(i)	Median 8 Quartiles 6, 24	B1 B2 3		B1 for each. Allow IQR = 24 - 6
	(ii)	Extreme values/skew distort mean or 35 mentioned	B1 1		Accept just "data skewed". Not "anomaly"
	(iii)	Advantage: retains data values Disadv: harder to read (eg) median harder to compare distr's visual comparison harder	B1 B1 2		Not "Can be shown on same diag"
3	(i)	2 3 4 1 6 5 7 | 6 5 4 7 2 3 1 1 2 3 4 5 6 7 | 7 6 5 4 3 2 1 $\Sigma d^2 = 14$ $r_s = 1 - \frac{6\Sigma d^2}{7(7^2-1)}$ $r_s = ¾$	M1 M1 A1 M1 A1 5		Rank both sets consistently Find Σd^2, dep ranks attempted. Allow arith errors $\Sigma d^2 = 14$ Use formula correctly, dep 2nd M1 Answer ¾ or a.r.t. 0.750
	(ii)	Rankings generally agree dep $r_s > 0.5$	B1f 1		Must have "agree" or "similar" etc, Not 'rankings well correlated' If $r_s < 0.5$, "generally don't agree": B1
4	(i)	$k = 1 - \left(\frac{1}{4} + \frac{1}{5} + \frac{2}{5} + \frac{1}{10}\right)$ $^1/_{20}$	M1 A1 2		Use $\Sigma p = 1$ or 0.05
	(ii)	$E(X) = \Sigma xp(x)$ $= -1/10$ $\Sigma x^2p(x) = 2$ $\Sigma x^2p(x) - \mu^2$ $= 1.99$	M1 A1 M1 M1 A1 5		Use $\Sigma xp(x)$ with a value for k and correct signs $-1/10$ or -0.1 only Attempt $\Sigma x^2p(x)$ } or $\Sigma(x-\mu)^2p(x)$: M2 Subtract their μ^2 } Answer, 1.99 or 1 99/100
5	(i)	(a) Geo(0.05) $(19/20)^5(1/20)$ $= 0.0387$	M1 M1 A1 3		Geo(0.05) or 0.95 stated or implied q^5p attempted Answer, a.r.t. 0.0387 ISW
		(b) $(19/20)^{10}$ $= 0.599$	M1 M1 A1 3		q^{10} or $1 - p - pq \ldots - pq^9$ [q^9 or q^{11}, or one wrong term: M1M0] Answer, a.r.t. 0.599 $1 - (^{19}/_{20})^{10}$: M0M0A0
	(ii)	Mean = $1/p$ $= 20$	M1 A1 2		20, cao
6	(i)	B(5, 3/8)	M1		B(5, 3/8) stated or $^3/_8$, $^5/_8$ seen and sum of powers = 5
		$^5C_2(3/8)^2(5/8)^3$ $= 5625/16384$ or 0.343	M1 3 A1		Correct expression Answer, a.r.t. 0.343 ISW
	(ii)	$½\,p_1 = ^5/_8$ $p_1 = ¾$ **AG**	M1 A1 2		or $^3/_8 / ^1/_2$ or $^3/_8 \times 2$ ¾ correctly obtained. Must see explicit step. Verification eg $^1/_2 \times ^3/_4 = ^3/_8$ or $^3/_8 / ^3/_4 = ^1/_2$: M1A1
	(iii)	$½\,p_2 = ^1/_3$ $p_2 = ^2/_3$	M1 A1 2		or $^1/_3 / ^1/_2$ or $^1/_3 \times 2$ Answer 2/3 or a.r.t. 0.667

7	(i)	Boxes are independent Probability same for each box	B1 B1 2		Both must be in context
	(ii)	(a) B(8, 0.1) 0.4305 (b) $1 - P(\leq 1)$ 0.1869	M1 A1 M1 A1 4		B(8, 0.1) stated or 0.1, 0.9 seen and sum of powers =8 0.43[05] correct $1 - 0.8131$ or $1 - (0.9^8 + 8x0.9^7x\,0.1)$ correct Answer, a.r.t. 0.187
	(iii)	$2 \times 0.4305 \times 0.1869$ 0.16092	M1 M1 A1 3		(a) x (b) } 2 x (a) × (b) } Answer, a.r.t. 0.161
8	(i)	$\frac{2 \times 7!}{8!}$ $= ¼$	M1 M1 A1 3		7! and 8! used or $^7P_7$ and $^8P_8$ Correct formula, with "2 ×" Answer, $^1/_4$ or 0.25 only
	(ii)	$^1/_4$ or $4! \times 4!$ or $3! \times 3!$ or $^3/_4$, $\left(\frac{1}{4}\right)^2$ or $\frac{3! \times 3!}{4! \times 4!}$ $= ^1/_{16}$	M1 M1 A1 3		 Correct expression or 0.0625
	(iii)	Attempt subdivide, allow one error. Correct subdivision into 3 or 13 cases Correct expression $= \frac{13}{16}$	M1 M1 M1 A1 4		By description or listing or implied by probs, eg $1 - $ (ii) $- $ P(sep by 1) All 3 or all 13 cases clearly present or 0.8125 or a.r.t. 0.813 only
		Eg correct: $1 - 3 \times \frac{1}{16}$; $1 -$ (ii) $- 2 \times \frac{3! \times 3!}{4! \times 4!}$ $\frac{3! \times 3! \times 13}{(4! \times 4!)}$; $(^3/_4)^2 + 2 \times ^1/_4 \times ^2/_4$			Eg incorrect: $1 - \frac{3! \times 3! \times 3}{8!}$: M1M1M0A0 $1 - ^1/_{16} - \frac{3! \times 3!}{4! \times 4!}$: M1M0M0A0
9	(i)	$\frac{264 - \frac{90 \times 15}{5}}{1720 - \frac{90^2}{5}}$ or $\frac{264 - 5 \times 18 \times 3}{1720 - 5 \times 18^2}$ $= -0.06$ AG $y - ^{15}/_5 = -0.06(x - ^{90}/_5)$ $y = 4.08 - 0.06x$	M1 A1 M1 A1 4		Formula correctly used -0.06 correctly obtained or $a = ^{15}/_5 - (-0.06) \times ^{90}/_5$ Complete equation correct
	(ii)	Substitute $x = 20.5$ ($y = 2.85$) Substitute $x = 19.5$ ($y = 2.91$) $2.91 - 2.85 = 0.06$	M1 M1 A1 3		Allow 20 ($y = 2.88$) or 20.49 Answer 0.06 or 0.06, c.w.d
	(iii)	-0.6, 0.5	B1 B1 2		-0.6 correct 0.5 correct
	(iv)	1.5 Calculated equation minimises this quantity	B1 B1 2		Not "Low value for Σe^2 means points near line"
	(v)	$\bar{e} = \Sigma e_i/5$ $= 0$ $\Sigma e_i^2/5$ (- her $\bar{e}$)^2 $= 0.3$	M1 A1 M1 A1 4		$\Sigma e_i/5$ used Answer 0, cwd, cao $\Sigma e_i^2/5$ 0.3 only, must see -0^2 or -0 in variance. ie: No working: $\bar{e} = 0$: M1A1; Var = 0.3: M1A0