Question Number	Scheme	Marks
1 (a) (i)	$X \sim \mathrm{B}(14, 0.2)$	
	$[\mathrm{P}(X = 2) =] {}^{14}C_2 \times 0.2^2 \times 0.8^{12}$	M1
	$= 0.2501$ awrt 0.2501	A1
(ii)	$X \sim \mathrm{B}(25, 0.2)$	
	$\mathrm{P}(X > 3) = 1 - \mathrm{P}(X \leqslant 3) = 1 - 0.2340$ or $1 - (0.0038 + 0.0236 + 0.0708 + 0.1358)$	M1
	$= 0.7660$ awrt 0.766	A1
		(4)
(b)(i)	$[np = 6 \Rightarrow] n = \dfrac{6}{0.2}$	M1
	$= 30$	A1
		(2)
(ii)	$Y \sim \mathrm{B}(n, 0.2)$ we require $\mathrm{P}(Y \geqslant 1) > 0.95$	
	$1 - \mathrm{P}(Y = 0) > 0.95 \Rightarrow \mathrm{P}(Y = 0) < 0.05$	M1
	$[{}^{n}C_0 \times 0.2^0] \times 0.8^n < 0.05$	M1
	$0.8^{14} = 0.04398...[< 0.05]$ | $n > \dfrac{\ln 0.05}{\ln 0.8} \Rightarrow n > 13.425$	dM1
	$n = 14$	A1
		(4)

	Notes	**Total 10**
(a) (i)	**M1**	For writing or using ${}^{14}C_2 \times 0.2^2 \times 0.8^{12}$ (Allow 91 for ${}^{14}C_2$)
	A1	awrt 0.2501 **NB** 0.2501 with no working scores M1A1
(ii)	**M1**	For writing or using $1 - \mathrm{P}(X \leqslant 3)$
	A1	awrt 0.766 **NB** awrt 0.766 with no working scores M1A1
(b)(i)	**M1**	For use of $np = 6$ e.g $0.2n = 6$ (Allow $\geqslant$)
	A1	Cao
(ii)	**M1**	For writing or using $\mathrm{P}(Y \geqslant 1) = 1 - \mathrm{P}(Y = 0)$ (Allow $\mathrm{P}(Y \geqslant 1) = 1 - \mathrm{P}(Y \leqslant 0)$)
	M1	For $0.8^n < 0.05$ oe (Allow = or $\leqslant$)
	dM1	Dependant on previous M1 For substitution of n (allow $0.8^{13} = 0.05497\ldots$) or rearranging to $n > \ldots$ (Allow = or $\geqslant$) If using logs allow any base e.g. $n > \log_{0.8} 0.05$
	A1	Cao