Question	Scheme	Marks	AOs
3(a)(i) **(ii)**	$\left[\mathrm{P}\left(Y \cap X'\right) =\right]$ 0.2	B1	1.1b
	$\left[\mathrm{P}\left(Y \middle\| X'\right) =\right]$ $\dfrac{\mathrm{P}\left(Y \cap X'\right)}{\mathrm{P}\left(X'\right)}$	M1	3.1a
	$= \dfrac{0.2}{b+0.2}$	A1	1.1b
		(3)	
(b)	$\dfrac{a}{a+0.2} = \dfrac{0.2}{b+0.2}$	M1	3.1a
	$ab + 0.2a = 0.2a + 0.2 \times 0.2$	dM1	1.1b
	$ab = 0.04$ *	A1*cso	1.1b
		(3)	
(c)	$a + b = 1 - 0.3 - 0.2 \quad (= 0.5)$	B1	1.1b
	e.g. $a\left(0.5 - a\right) = 0.04$	M1	3.1a
	$a^2 - 0.5a + 0.04 = 0$	dM1	1.1b
	$a = 0.4$ [or 0.1]	dM1	1.1b
	$a = 0.4$ and $b = 0.1$	A1	1.1b
		(5)	
(d)	e.g. $\mathrm{P}\left(X\right) = 0.3 + "0.4" \quad (= 0.7)$ and $\mathrm{P}\left(X \middle\| Y\right) = \dfrac{"0.4"}{"0.4" + 0.2} \quad (= 0.666...)$ or $\mathrm{P}\left(X\right) \times \mathrm{P}\left(Y\right) = \left(0.3 + "0.4"\right)\left("0.4" + 0.2\right) \quad (= 0.42)$ and $\mathrm{P}\left(X \cap Y\right) = "0.4"$	M1	2.1
	$\mathrm{P}\left(X\right) \neq \mathrm{P}\left(X \middle\| Y\right)$ or $\mathrm{P}\left(X\right) \times \mathrm{P}\left(Y\right) \neq \mathrm{P}\left(X \cap Y\right)$ […hence not independent]	A1cso	1.1b
		(2)	
			(13 marks)

Notes:	
(a)(i) **(ii)**	**B1:** cao **M1:** correct ratio of probabilities **A1:** correct expression
(b)	**M1:** attempts quotient equation in a and b, with one side correct (allow RHS = their (a)(ii)) **dM1:** eliminate fractions from their equation **A1*:** cso
(c)	**B1:** makes use of $\Sigma p = 1$ **M1:** solve $ab = 0.04$ with their $a + b = 0.5$ to obtain equation in one variable **dM1:** simplify their quadratic **dM1:** solve their quadratic equation to reach at least 0.4 or 0.1 **A1:** both a and b correct, any extra values dismissed
(d)	**M1:** attempt all necessary probabilities for an appropriate test (allow in terms of a or b) **A1:** all correctly evaluated probabilities used in an appropriate test to show not independent