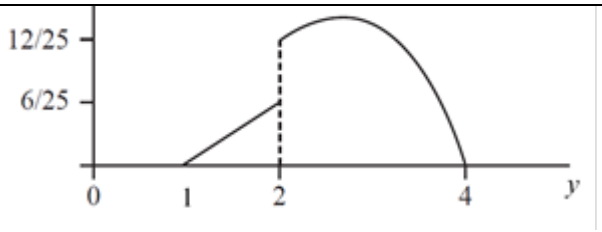
Question Number	Scheme	Marks
3. (a)		M1 A1 (2)
(b)	$\frac{\mathrm{d}\left(\frac{3}{50}\left(4y^2-y^3\right)\right)}{\mathrm{d}y}=\frac{3}{50}\left(8y-3y^2\right)$	M1
	$\frac{3}{50}\left(8y-3y^2\right)=0$; $\underline{y=\frac{8}{3}}$ oe	M1; A1 (3)
(c)	$\mathrm{E}(Y^2)=\int_1^2\left(\frac{6}{25}y^3-\frac{6}{25}y^2\right)\mathrm{d}y+\int_2^4\left(\frac{12}{50}y^4-\frac{3}{50}y^5\right)\mathrm{d}y$	M1
	$=\left[\frac{6}{100}y^4-\frac{6}{75}y^3\right]_1^2+\left[\frac{12}{250}y^5-\frac{3}{300}y^6\right]_2^4$	A1
	$=\left[\left(\frac{8}{25}\right)-\left(-\frac{1}{50}\right)\right]+\left[\left(\frac{1024}{125}\right)-\left(\frac{112}{125}\right)\right]$; $=\underline{\frac{1909}{250}}$ or **<u>7.636</u>** or **<u>7.64</u>**	dM1; A1 (4)
(d)	$\mathrm{Var}(Y)=\text{"}\frac{1909}{250}\text{"}-2.696^2$	M1
	$=0.367584$ awrt **<u>0.368</u>**	A1 (2)
(e)	$\frac{1}{2}(y-1)\times\frac{6}{25}(y-1)=0.1$ <u>or</u> $\int_1^x\frac{6}{25}(y-1)\,\mathrm{d}y=0.1$	M1
	$\frac{1}{2}(y-1)\times\frac{6}{25}(y-1)=0.1$ <u>or</u> $\frac{6}{25}\left[\left(\frac{x^2}{2}-x\right)+\frac{1}{2}\right]=0.1$ <u>or</u> $\frac{6}{50}(x-1)^2=0.1$	A1
	$(y-1)^2=\frac{5}{6}$ <u>or</u> $y=1\pm\sqrt{\frac{5}{6}}$; $y=1.9128...$ awrt **<u>1.91</u>**	dM1; A1 (4) **Total 15**

	Notes
(a)	**M1:** the two parts must be the right shape and not joined. Ignore labels and condone if it goes below x - axis **A1:** for 6/25, 12/25, 1, 2 and 4 and must not go beyond 4 or < 1 [Can allow "freehand" straight line]
(b)	**1st M1:** for attempting to differentiate $y^n \to y^{n-1}$ for n = 2 <u>or</u> 3 **2nd M1:** for equating their differential ($\neq \mathrm{f}(y)$) to zero and an attempt at solving so must reach y = … **A1:** for $\frac{8}{3}$ oe and allow awrt 2.67 If $y = 0$ is seen it must be rejected.
(c)	**1st M1:** for using $\int y^2\mathrm{f}(y)$ for both parts, <u>and</u> an attempt at integration (some $y^n \to y^{n+1}$) Ignore limits. **1st A1:** for correct integration for both parts. Ignore limits. **2nd dM1 :** dep on 1st M1for adding the 2 parts together <u>and</u> substituting the correct limits in to each part. **2nd A1:** allow 7.64 or 7.636 You will need to check that they have used algebraic integration.
(d)	**M1:** for "their part(c)" – 2.696 ^{2} **A1:** for awrt 0.368
(e)	**1st M1:** allow $\frac{1}{2}t\times\frac{6}{25}(t-1)=0.1$ <u>or</u> $\int_1^x\frac{6}{25}(y-1)\,\mathrm{d}y=0.1$ <u>and</u> some integration and sub' of 1 and x **1st A1:** for a correct equation in any form **2nd dM1:** dependent on 1st M1 for a correct method for solving their equation. Implied by correct answer. **2nd A1:** for awrt 1.91 (second solution should be rejected)