Question Number	Scheme	Marks
7 (a)	$\int_0^m \left(\frac{1}{4}x - \frac{1}{64}x^3\right) \mathrm{d}x \left[= \frac{1}{2}\right]$	M1
	$\left[\frac{1}{8}x^2 - \frac{1}{256}x^4\right]_0^m \left[= \frac{1}{2}\right]$	A1
	$m^4 - 32m^2 + 128 = 0$ **or** for either F(2.1645) or F(2.1655)	M1
	$m^2 = 16 \pm \sqrt{128}$ ($= 4.686...$ or $27.313...$) **or** both F(2.1645) and F(2.1655)	M1
	$m = \sqrt{16 - \sqrt{128}} = 2.165$ *	A1*
		(5)
(b)	$\mathrm{E}\left(\frac{1}{Y}\right) = \frac{4}{255}\int_1^4 (y^{-1}y^3)\,\mathrm{d}y = \frac{4}{255}\int_1^4 (y^2)\,\mathrm{d}y$	M1
	$\frac{4}{255}\left[\frac{y^3}{3}\right]_1^4 = \frac{4}{255} \times \frac{63}{3}\left[= \frac{28}{85}\right]$	dM1
	$\mathrm{E}\left(\frac{1}{Y^2}\right) = \frac{4}{255}\int_1^4 (y^{-2}y^3)\,\mathrm{d}y = \int_1^4 \frac{4}{255}y\mathrm{d}y$	M1
	$\frac{4}{255}\left[\frac{y^2}{2}\right]_1^4 = \frac{4}{255} \times 7.5\left[= \frac{2}{17}\right]$	dM1
	$\mathrm{Var}\left(\frac{1}{Y}\right) = \frac{2}{17} - \left(\frac{28}{85}\right)^2 = \frac{66}{7225}$ *	A1*
		(5)
(c)	$\mathrm{Var}\left(4 - \frac{5}{Y}\right) = 25 \times \frac{66}{7225}$	M1
	$= \frac{66}{289} = 0.2283...$ awrt **0.228**	A1
		(2)

	Notes	**Total 12**
(a)	**M1**	For $\int \mathrm{f}(x)\,\mathrm{d}x$ ignore limits and $= 0.5$
	A1	For correct integration ignore limits and $= 0.5$
	M1	For substitution of limits leading to a correct equation **or** use of 2.1645 or 2.1655
	M1	Solving the equation leading to $m^2 = ...$ or substitution of both 2.1645 (= 0.499891) and 2.1655 (=0.500273)
	A1*	$m = \sqrt{16 - \sqrt{128}}$ or $0.499... < m < 0.500...$ leading to the given answer
(b)	**M1**	For $\int \frac{1}{y}\mathrm{f}(y)\,\mathrm{d}y$ Ignore limits
	dM1	Dep on previous M1. For substitution of limits into integrated expression
	M1	For $\int \frac{1}{y^2}\mathrm{f}(y)\,\mathrm{d}y$ Ignore limits

	dM1	Dep on previous M1. For substitution of limits into integrated expression
	A1*	Dep on all M marks. For use of $\mathrm{E}\left(\frac{1}{Y^2}\right)-\left(\mathrm{E}\left(\frac{1}{Y}\right)\right)^2$ leading to the given answer
(c)	**M1**	For use of $5^2\,\mathrm{Var}\left(\frac{1}{Y}\right)$
	A1	awrt 0.228