Question Number	Scheme	Marks
1 (a)	$\int_1^2 k\left(\frac{1}{2}x^3-3x^2+ax+1\right)\mathrm{d}x[=1]$	M1
	$k\left[\frac{1}{8}x^4-x^3+\frac{1}{2}ax^2+x\right]_1^2[=1]$	A1
	$k\left(2-8+2a+2\right)-k\left(\frac{1}{8}-1+\frac{1}{2}a+1\right)=1$ **or** $k\left(2a-4\right)-k\left(\frac{1}{8}+\frac{1}{2}a\right)=1$	dM1
	$-\frac{33}{8}k+\frac{3}{2}ka=1 \quad \therefore k\left(12a-33\right)=8$ *	A1 *
		(4)
(b)	$\frac{\mathrm{d}f(x)}{\mathrm{d}x}=k\left(\frac{3}{2}x^2-6x+a\right)$	M1
	$\frac{3}{2}x^2-6x+5=0$ **or** $\frac{4}{9}x^2-\frac{16}{9}x+\frac{40}{27}=0$	dM1
	$x=\frac{6\pm\sqrt{6^2-4\times1.5\times5}}{3}$	M1
	$x=2-\frac{\sqrt{6}}{3}$ oe or 1.183... awrt 1.18	A1
		(4)

	Notes		Total 8
1(a)	**M1**	Attempting to integrate f(x), (at least one term $x^n \to x^{n+1}$). Ignore limits. No Need to equate to 1	
	A1	Fully correct integration. Allow not simplified. Ignore limits and accept any letters. Allow + C No Need to equate to 1	
	dM1	Dep on 1st M1. Subst in correct limits, subtracting results and equate to 1 Allow if they have + C the use of F(2) = 1 and F(1) = 0 to form 2 equations and solve to eliminate + C	
	A1*	Answer is given. Correct solution only. At least one correct line of working required between $k\left(2a-4\right)-k\left(\frac{1}{8}+\frac{1}{2}a\right)=1$ and the final given answer.	
(b)	**M1**	Attempting to differentiate f(x), (at least one term $x^n \to x^{n-1}$). Condone missing k or incorrect value for k	
	dM1	Dependent on first Method mark being awarded. Putting their differential (or multiple of) = 0 May be implied by awrt 1.18 or awrt 2.82	
	M1	Correct method for solving their 3 term quadratic equation. May be implied by awrt 1.18 or awrt 2.82 Minimum for method if final answer is incorrect is of the form $\frac{6\pm\sqrt{6}}{3}$	
	A1	Allow equivalent exact answer. awrt 1.18 Must eliminate the 2.816… or clearly indicate which of the 2 solutions is their answer	