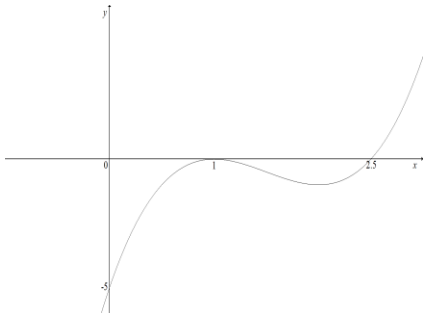
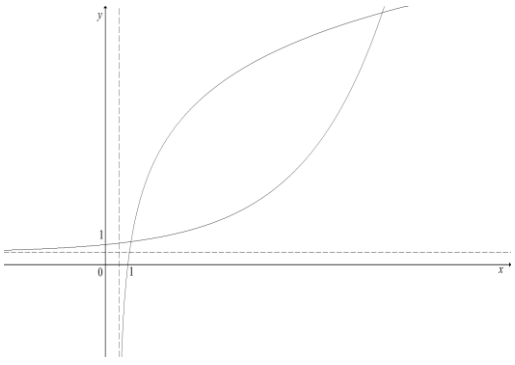
Question	Answer	Marks	Guidance
1(a)	$b = 3$	**B1**	
	Use of $y = a\cos bx + c$, with *their b* and either set of given coordinates	**M1**	*their* $b \neq \frac{2\pi}{3}$
	$c = -2$	**A1**	
	$a = 5$	**A1**	
1(b)	Minimum when $\cos bx = -1$ soi	**B1**	Allow for *their b*, $b \neq \frac{2\pi}{3}$
	$x = \frac{\pi}{3}$	**B1**	Allow if *b* is correct
	$y = -7$	**B1**	**FT** on *their c – their a*
	Alternative		
	$\frac{dy}{dx} = -15\sin 3x$	**(B1)**	**FT** on *their a, b* and *c*, $b \neq \frac{2\pi}{3}$
	When $\frac{dy}{dx} = 0$, $x = \frac{\pi}{3}$	**(B1)**	Allow if *b* is correct
	$y = -7$	**(B1)**	**FT** on *their c – their a*
2(a)	$(f'(x)) = 2(x-1)(2x-5) + 2(x-1)^2$ oe or $6x^2 - 18x + 12$	**M1**	For use of product rule or expansion and differentiation
	$2(x+1)(2x-5) + 2(x-1)^2 = 0$ oe or $6x^2 - 18x + 12 = 0$ oe	**M1**	**Dep** for equating *their* quadratic $f'(x)$ to zero and attempt to solve to obtain $x = \ldots$
	$x = 1, y = 0$ $x = 2, y = -1$	**2**	**A1** for any correct pair, must be from correct working only
2(b)		**3**	**B1** for a correct cubic shape **B1** for a correct cubic shape in the correct position, touching the *x*-axis once in the 4th quadrant and intersecting once with the positive *x*-axis **B1** for all intercepts and no extras
2(c)	$k < -1$	**B1**	
	$k > 0$	**B1**	

Question	Answer	Marks	Guidance
3(a)	$ACB = 2\tan^{-1}\left(\frac{12}{5}\right)$ oe	**M1**	
	$ACB = (2\times 1.176\ldots)$ = 2.35 to 2 dp	**A1**	Must see justification to 2 dp
3(b)	Arc length = $5\times ACB$	**B1**	
	Perimeter = 35.8	**B1**	Allow awrt 35.8
3(c)	Area = $(12\times 5)-\left(\frac{1}{2}\times 5^2\times 2.35\right)$	**M2**	**M1** for area of kite or area of sector **M1 dep** for kite area – sector area
	30.6	**A1**	Allow greater accuracy Any use of fractions gets **A0**
4(a)(i)	$\frac{2}{3}$	**B1**	Allow $x>\frac{2}{3}$, $a=\frac{2}{3}$, but not $x=\frac{2}{3}$ unless it is replaced with a correct answer
4(a)(ii)	$\mathbb{R}$ oe	**B1**	Must be using correct notation
4(a)(iii)	$3y-2=e^{\frac{x}{4}}$ or $3x-2=e^{\frac{y}{4}}$	**M1**	For valid attempt to reach this stage
	$f^{-1}(x)=\frac{1}{3}\left(e^{\frac{x}{4}}+2\right)$	**A1**	Must be using correct notation
	Domain $x\in\mathbb{R}$ Range $f^{-1}>\frac{2}{3}$	**B2**	**B1** for each, must be using the correct notation.
4(a)(iv)		**4**	**B1** for the shape of $y = f(x)$ in the first and fourth quadrants only **B1 dep** on previous **B1** for (1, 0) **B1** for a correct shape for $f^{-1}(x)$, or **FT** on *their* $y = f(x)$ with correct shape in first quadrant for symmetry about $y = x$ soi **B1 dep** on previous **B1**, for (0, 1) and at least one point of intersection with $y = f(x)$ correct in the first quadrant