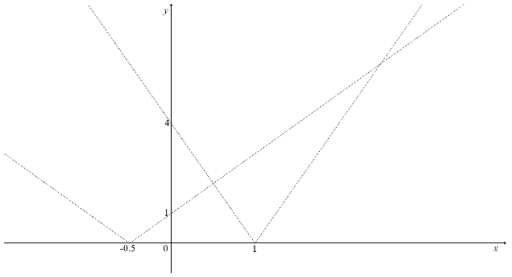
Question	Answer	Marks	Guidance
1	$p^{-\frac{3}{2}}q^{\frac{8}{3}}r^{-2}$	**3**	**B1** for $a=-\frac{3}{2}$ **B1** for $b=\frac{8}{3}$ **B1** for $c=-2$
2(a)	$\frac{ds}{dt}=-\frac{3}{2}(1+3t)^{-\frac{3}{2}}$	**2**	**M1** for $a(1+3t)^{-\frac{3}{2}}$ **A1** all correct
	When t = 1, $\frac{ds}{dt}=-\frac{3}{16}$ Speed = $\frac{3}{16}$	**A1**	
2(b)	Acceleration = $\frac{27}{4}(1+3t)^{-\frac{5}{2}}$	**B1**	Allow unsimplified
	$(1+3t)^{-\frac{5}{2}}$ is always positive (so acceleration can never be zero.)	**B1**	Any valid explanation.
3(a)	$f(x) \in \mathbb{R}$ oe	**B1**	Must be using correct notation, allow $y \in$
3(b)	$5(\ln(3x+1))-7=13$	**M1**	For correct order
	$x=\frac{e^4-1}{2}$	**2**	**M1** for a correct attempt to solve to get $x=$, allow one sign error **Dep** on previous M mark **A1** all correct must be exact
3(c)	$(f'(x)=)\ \frac{2}{2x+1}$	**2**	**M1** for $\frac{a}{2x+1}$ **A1** all correct
	$(g^{-1}(x)=)\ \frac{x+7}{5}$	**B1**	soi
	$2x^2+15x-3=0$	**M1**	for equating and forming a 3-term quadratic equation = 0
	$x = 0.195, -7.69$	**M1**	For solution of *their* 3-term quadratic
	$x = 0.195$	**A1**	For discounting negative root.
4(a)	$[f(x)=]\pm 4(x+2)(x-1)(x-3)$	**3**	**B1** for $\pm$ **B1** for 4 **B1** for $(x+2)(x-1)(x-3)$

Question	Answer	Marks	Guidance
4(b)(i)		**3**	**B1** for 2 V shapes which intersect twice in the first quadrant, with vertices on the x-axis, must be straight lines, not curves. **B1** for –0.5 and 1 on the x-axis **B1** for 1 and 4 on the y-axis
4(b)(ii)	$2x + 1 = 4(x - 1)$	**M1**	For attempt to solve to get $x =$
	$x = 2.5$	**A1**	
	$2x + 1 = -4(x - 1)$ oe	**M1**	For attempt to solve to get $x =$
	$x = 0.5$	**A1**	
	Alternative $4x^2 + 4x + 1 = 16x^2 - 32x + 16$	**(M1)**	For attempt to square each equation and equate
	$12x^2 - 36x + 15 = 0$ oe	**(M1)**	Dep on previous M mark for attempt to simplify to a 3-term quadratic equation, equated to zero and attempt to solve
	$x = 2.5 \quad x = 0.5$	**(A2)**	**A1** for each
5(a)	$\begin{pmatrix} -7.5 \\ 4 \end{pmatrix}$ or $-\frac{1}{2}\begin{pmatrix} 15 \\ -8 \end{pmatrix}$ oe	**2**	**B1** for $\begin{pmatrix} 7.5 \\ -4 \end{pmatrix}$ oe or **B1** for $\begin{pmatrix} -15 \\ 8 \end{pmatrix}$
5(b)	$15a + 2a + 1 = 6b + 6a$ $5b + 2 = 2$	**M1**	For equating like vectors in order to obtain at least one equation
	$a = 1, b = 2$	**2**	**Dep M1** for attempt to solve both equations **A1** for both
6(a)	$k = 14$	**B1**	
	$k = 6$	**B1**	