Question	Answer	Marks	Partial Marks
6(a)	Correct derivative $\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{x^2-1}{x^2+1}\right)=\frac{(x^2+1)(2x)-(x^2-1)(2x)}{(x^2+1)^2}$ or $2x\left(x^2+1\right)^{-1}-2x\left(x^2-1\right)\left(x^2+1\right)^{-2}$	**2**	**M1** for an attempt at the quotient or product rule **A1** fully correct
	Correct derivative $\frac{\mathrm{d}y}{\mathrm{d}x}=4\left(\frac{x^2-1}{x^2+1}\right)^3\left(\frac{(x^2+1)(2x)-(x^2-1)(2x)}{(x^2+1)^2}\right)$ or $4\left(\frac{x^2-1}{x^2+1}\right)^3\left(2x\left(x^2+1\right)^{-1}-2x\left(x^2-1\right)\left(x^2+1\right)^{-2}\right)$	**2**	**Dep M1** for $\frac{\mathrm{d}y}{\mathrm{d}x}=k\left(\frac{x^2-1}{x^2+1}\right)^3\times \mathrm{f}(x)$ where f(x) is *their* attempt to differentiate **A1** fully correct
	Correct completion to $\frac{16x(x^2-1)^3}{(x^2+1)^5}$	**A1**	
	Alternative		
	Correct derivatives $u=(x^2-1)^4 \quad \mathrm{d}u=4(x^2-1)^3\times(2x)$ oe and $v=(x^2+1)^4 \quad \mathrm{d}v=4(x^2+1)^3\times(2x)$ oe	**(2)**	**M1** for either correct OR for $\mathrm{d}u=4(x^2-1)^3\times \mathrm{g}(x)$ where g(x) is an attempt to differentiate x^2-1 and $\mathrm{d}v=4(x^2+1)^3\times \mathrm{h}(x)$ where h(x) is an attempt to differentiate x^2+1
	Correct derivative $\frac{\mathrm{d}y}{\mathrm{d}x}=$ $\frac{(x^2+1)^4\times4(x^2-1)^3(2x)-(x^2-1)^4\times4(x^2+1)^3(2x)}{\left((x^2+1)^4\right)^2}$ or $4(2x)\left(x^2-1\right)^3\left(x^2+1\right)^{-4}-$ $4(2x)\left(x^2-1\right)^4\left(x^2+1\right)^{-5}$	**(2)**	**M1** for an attempt at the product or quotient rule
	Correct completion to $\frac{16x(x^2-1)^3}{(x^2+1)^5}$	**(A1)**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Partial Marks</th></tr>
<tr><td>6(b)(i)</td><td>their $16x(x^2-1)^3=0$
therefore $x=0,\ x^2-1=0 \rightarrow x=\pm1$ oe</td><td>B1</td><td>FT their 16
Allow for their $16x(x^2-1)=0$</td></tr>
<tr><td>6(b)(ii)</td><td>Any two of
<table>
<tr><td>x</td><td>$-1<x<0$</td><td>0</td><td>$0<x<1$</td></tr>
<tr><td>$\frac{dy}{dx}$</td><td>positive</td><td>0</td><td>negative</td></tr>
</table>
<table>
<tr><td>x</td><td>$0<x<1$</td><td>1</td><td>$x>1$</td></tr>
<tr><td>$\frac{dy}{dx}$</td><td>negative</td><td>0</td><td>positive</td></tr>
</table>
<table>
<tr><td>x</td><td>$x<-1$</td><td>-1</td><td>$-1<x<0$</td></tr>
<tr><td>$\frac{dy}{dx}$</td><td>negative</td><td>0</td><td>positive</td></tr>
</table></td><td>M1</td><td>or equivalent. Must show change in the sign of first derivative around the stationary points

M0 only if second derivative is used</td></tr>
<tr><td></td><td>$x=1$ and $x=-1$ are minimum points</td><td>A1</td><td></td></tr>
</table>

Question	Answer	Marks	Partial Marks
7	$2x^3 - 9x^2 + 10x - 3[= 0]$	**B1**	
	Finds a correct linear factor $x - 1$ or $x - 3$ or $2x - 1$	**M1**	
	Finds the correct corresponding quadratic factor For $(x - 1)$ gives $2x^2 - 7x + 3$ or For $(x - 3)$ gives $2x^2 - 3x + 1$ or For $(2x - 1)$ gives $x^2 - 4x + 3$	**2**	**M1** for a corresponding quadratic factor with 2 terms correct
	Factorises *their* 3-term quadratic factor or solves *their* 3-term quadratic equation	**M1**	
	$x = \frac{1}{2}$, 1, 3	**A1**	
	Alternative		
	$2x^3 - 9x^2 + 10x - 3 = 0$	**(B1)**	
	Finds a correct linear factor $x - 1$ or $x - 3$ or $2x - 1$	**(M1)**	
	Finds a second correct linear factor $x - 1$ or $x - 3$ or $2x - 1$	**(M1)**	
	Finds a third correct linear factor $x - 1$ or $x - 3$ or $2x - 1$	**(M1)**	
	$x - 1$, $x - 3$ and $2x - 1$	**(A1)**	
	$x = \frac{1}{2}$, 1, 3	**(A1)**	
8(a)	$x > \frac{4}{12}$ oe	**B1**	allow $0.\dot{3}$ for $\frac{4}{12}$

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