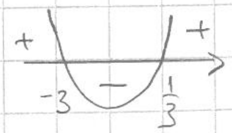
b) $f'(x) = \dfrac{(8x-3)\cdot(x^2+1)-(4x^2-3x)\cdot 2x}{(x^2+1)^2}$

$= \dfrac{\cancel{8x^3}+8x-3x^2-3\cancel{-8x^3}+6x^2}{(x^2+1)^2} = \dfrac{3x^2+8x-3}{(x^2+1)^2} = 0 \;|\cdot(\;)^2$

$\Leftrightarrow 3x^2+8x-3=0 \Leftrightarrow x = \begin{cases} -3 \\ \frac{1}{3} \end{cases}$



c)

		-3		$\frac{1}{3}$	
f'	$+$		$-$		$+$
f	$\nearrow$		$\searrow$		$\nearrow$
		max		min	

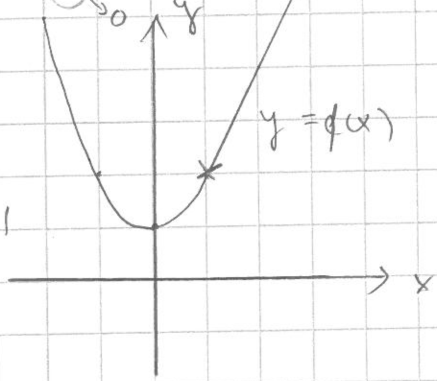
$f'(x) = \dfrac{\overbrace{3x^2+8x-3}}{\underbrace{(x^2+1)^2}_{>0}}$

$f(-3) = \frac{9}{2} > \lim\limits_{x\to\infty} f(x) = 4 \Rightarrow$ suurin arvo: $\frac{9}{2}$

$f(\frac{1}{3}) = -\frac{1}{2} < \lim\limits_{x\to-\infty} f(x) = 4 \Rightarrow$ pienin arvo: $-\frac{1}{2}$

$\lim\limits_{x\to\pm\infty} f(x) = \lim\limits_{x\to\pm\infty} \dfrac{4x^2-3x}{x^2+1} \left(\frac{\infty\pm\infty}{\infty}\right) = \lim\limits_{x\to\pm\infty} \dfrac{\cancel{x^2}(4-\overbrace{\frac{3}{x}}^{\to 0})}{\cancel{x^2}(1+\underbrace{\frac{1}{x^2}}_{\to 0})} = \dfrac{4-0}{1+0} = 4$

6. $f(x) = \begin{cases} x^2+1, & x<1 \\ 2x, & x \geq 1 \end{cases}$



f on (jatkuva ja) derivoituva ainakin kun $x \neq 1$

1° $\begin{cases} \lim\limits_{x\to 1-} f(x) = \lim\limits_{x\to 1-} (x^2+1) = 1^2+1 = 2 \\ \lim\limits_{x\to 1+} f(x) = \lim\limits_{x\to 1+} 2x = 2\cdot 1 = 2 \\ f(1) = 2\cdot 1 = 2 \end{cases}$

$\Rightarrow \lim\limits_{x\to 1-} f(x) = \lim\limits_{x\to 1+} f(x) = f(1) = 2 \Rightarrow f$ on jatkuva kohdassa 1

2° $f'_-(1) = \lim\limits_{x\to 1-} \dfrac{f(x)-f(1)}{x-1} = \lim\limits_{x\to 1-} \dfrac{(x^2+1)-2}{x-1} = \lim\limits_{x\to 1-} \dfrac{\overset{1^2}{x^2-1}}{x-1} \left(\frac{0}{0}\right) = \lim\limits_{x\to 1-} \dfrac{\cancel{(x-1)}(x+1)}{\cancel{x-1}}$

$= \lim\limits_{x\to 1-} (x+1) = 1+1 = 2$

$f'_+(1) = \lim\limits_{x\to 1+} \dfrac{f(x)-f(1)}{x-1} = \lim\limits_{x\to 1+} \dfrac{2x-2}{x-1} \overset{\left(\frac{0}{0}\right)}{=} \lim\limits_{x\to 1+} \dfrac{2\cancel{(x-1)}}{\cancel{x-1}} = \lim\limits_{x\to 1+} 2 = 2$

$\Rightarrow f'_-(1) = f'_+(1) = 2 \Rightarrow f$ on derivoituva kohdassa 1

$\Rightarrow$ f on derivoituva R:ssä