b) $D_f = \mathbb{R}$

$f'(x) = 3x^2 + 3$ $\qquad$ $f''(x) = 6x$

Tableau donnant la courbure :

		0	
	$-$	|	$+$

concave $\qquad$ convexe

e) $D_f = \mathbb{R} - \{1\}$

$$f'(x) = \frac{1\cdot(x-1) - x\cdot 1}{(x-1)^2} = \frac{x-1-x}{(x-1)^2} = \frac{-1}{(x-1)^2}$$

$$f''(x) = (-1)\cdot(-1)\cdot\frac{2(x-1)\cdot 1}{(x-1)^4} = \frac{2(x-1)}{(x-1)^4}$$

$$= \frac{2}{(x-1)^4}$$

Tableau donnant la courbure :

		1	
	+	‖	+
	∪		∪
	convexe		convexe

d) $D_f = \mathbb{R}$

$$f'(x) = -\frac{2x}{(x^2+1)^2}$$

$$f''(x) = -\frac{2(x^2+1)^2 - 2x \cdot 2(x^2+1) \cdot 2x}{(x^2+1)^4}$$

$$= -\frac{(x^2+1)(2x^2+2-8x^2)}{(x^2+1)^4}$$

$$= -\frac{(-6x^2+2)}{(x^2+1)^3} = \frac{6(x^2-1/3)}{(x^2+1)^3}$$

$$x^2 - 1/3 = 0 \Leftrightarrow x = \pm 1/\sqrt{3} \simeq \pm 0{,}58$$

Tableau donnant la courbure :

		$-0{,}58$		$0{,}58$	
	+	0	−	0	+
	$\cup$ convexe	PI $(-0{,}58 ; 0{,}75)$	$\cap$ concave	PI $(0{,}58 ; 0{,}75)$	$\cup$ convexe