(e) $f(x) = \dfrac{1}{x^n}$, $a \in \mathbb{R} - \{0\}$

$$f'(a) = \lim_{x \to a} \frac{\frac{1}{x^n} - \frac{1}{a^n}}{x-a} = \lim_{x \to a} \frac{\frac{a^n - x^n}{x^n a^n}}{x-a} = \lim_{x \to a} -\frac{(x^n - a^n)}{x-a} \frac{1}{x^n a^n} =$$

$$= \lim_{x \to a} - \frac{(x-a)(x^{n-1} + x^{n-2}a + \cdots + x a^{n-2} + a^{n-1})}{(x-a)\, x^n a^n} \overset{x-a \neq 0}{=}$$

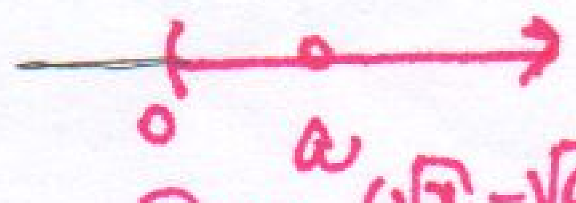
$$= \lim_{x \to a} - \frac{(x^{n-1} + x^{n-2}a + \cdots + x a^{n-2} + a^{n-1})}{x^n a^n} = \frac{-\overbrace{(a^{n-1} + a^{n-1} + \cdots + a^{n-1})}^{n\text{-parcelas}}}{a^n a^n} =$$

$$= \frac{-n\, a^{n-1}}{a^{2n}} = -n \cdot a^{(n-1)-2n} = -n\, a^{-n-1}$$

logo; $D_x(x^{-n}) = -n\, x^{-n-1}$

(f) $f(x) = \sqrt{x}$, $a \in (0, +\infty)$

$$f'(a) = \lim_{x \to a} \frac{\sqrt{x} - \sqrt{a}}{x-a} = \lim_{x \to a} \frac{\sqrt{x} - \sqrt{a}}{x-a} \frac{(\sqrt{x} + \sqrt{a})}{(\sqrt{x} + \sqrt{a})} = \lim_{x \to a} \frac{x-a}{(x-a)(\sqrt{x} + \sqrt{a})} \overset{x-a \neq 0}{=}$$



$\text{Dom}\left(\dfrac{\sqrt{x} - \sqrt{a}}{x-a}\right)$

$$= \lim_{x \to a} \frac{1}{\sqrt{x} + \sqrt{a}} = \frac{1}{\sqrt{a} + \sqrt{a}} = \frac{1}{2\sqrt{a}} = \frac{1}{2} a^{-\frac{1}{2}}$$