(g) $f(x) = \sqrt[n]{x}$, $a \in Dom f - \{0\}$

$$f'(a) = \lim_{x\to a} \frac{\sqrt[n]{x} - \sqrt[n]{a}}{x-a} \underset{\downarrow}{=} \lim_{u\to b} \frac{u-b}{u^n - b^n} = \lim_{u\to b} \frac{u-b}{(u-b)(u^{n-1} + u^{n-2}b + \dots + ub^{n-2} + b^{n-1})} \overset{u-b\neq 0}{\overset{\uparrow}{=}}$$

$$\begin{cases} u = \sqrt[n]{x} \iff x = u^n \\ b = \sqrt[n]{a} \iff a = b^n \\ x \to a \Rightarrow u \to b \end{cases}$$

$$= \lim_{u\to b} \frac{1}{u^{n-1} + u^{n-2}b + \dots + ub^{n-2} + b^{n-1}} = \frac{1}{n \cdot b^{n-1}} = \frac{1}{n} \cdot b^{1-n} = \frac{1}{n} \cdot (a^{\frac{1}{n}})^{1-n} =$$

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

Logo, $D_x(\sqrt[n]{x}) = \frac{1}{n} x^{\frac{1}{n} - 1}$

Questão 5:

$$|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

$$\left.\begin{aligned} \lim_{x\to 0^+} |x| &= \lim_{x\to 0^+} x = 0 \\ \lim_{x\to 0^-} |x| &= \lim_{x\to 0^-} -x = 0 \end{aligned}\right\} \lim_{x\to 0} |x| = |0| \Rightarrow |x| \text{ é contínua em } x=0$$

$|0| = 0$

$$\lim_{x\to 0^+} \frac{|x| - |0|}{x - 0} = \lim_{x\to 0^+} \frac{|x|}{x} = \lim_{x\to 0^+} \frac{x}{x} \overset{x\neq 0}{\overset{\uparrow}{=}} \lim_{x\to 0^+} 1 = 1$$

$$\lim_{x\to 0^-} \frac{|x| - |0|}{x - 0} = \lim_{x\to 0^-} \frac{|x|}{x} = \lim_{x\to 0^-} \frac{-x}{x} = \lim_{x\to 0^-} -1 = -1$$

$$\Rightarrow \nexists \lim_{x\to 0} \frac{|x| - |0|}{x - 0} \Rightarrow \nexists f'(0)$$