Using the special limits,compute the following limits

I)

a) $\lim_{x\to 0} \frac{1-\cos x}{x \operatorname{tg} x}$ b) $\lim_{x\to 0} \frac{\log(1+x)}{\sin x}$ c) $\lim_{x\to 0} \frac{\log(1+2x)}{\sin 3x}$

d) $\lim_{x\to 0} \frac{\log(1+x^2)}{x \sin 3x}$ e) $\lim_{x\to 0} \frac{e^{x}-e^{-x}}{x}$

f) $\lim_{x\to 0} \frac{(1+3x)^{\sqrt{2}}-1}{x}$ g) $\lim_{x\to 0} \frac{(1+x^2)^{\sqrt{3}}-1}{x \sin 2x}$

h) $\lim_{x\to 1} \frac{\log x}{x^2-1}$ i) $\lim_{x\to 0} \frac{1}{x} \log\left(\frac{\sin x}{x}\right)$

j) $\lim_{x\to 1} \frac{\log x}{\cos \frac{\pi}{2}x}$ (**Remember that** $\cos a = \sin\left(\frac{\pi}{2}-a\right)$)

k) $\lim_{x\to 2} \frac{\log(x-1)}{x-2}$ l) $\lim_{x\to 0} \frac{e^{x^2}-e^{-x^2}}{\log(1+4x^2)}$

II **Let** $f(x)=\begin{cases} \frac{\sin x}{x} & x>0 \\ ax+b & x\leq 0 \end{cases}$

Determin $a\in\mathbb{R}$ e $b\in\mathbb{R}$ such that
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$\lim_{x\to 0} f(x)=1$ e $\lim_{x\to 0} \frac{f(x)-ax-b}{x}=0$