1. e) Per justificar els límits.

$$\lim_{x\to+\infty} \frac{x\log x}{e^{2x}} = \lim_{x\to+\infty} \frac{x^2}{e^{2x}}\,\frac{\log x}{x} = \lim_{x\to+\infty} \Big(\underbrace{\frac{x}{e^x}}_{\substack{\downarrow x\to+\infty \\ 0}}\Big)^2 \cdot \underbrace{\frac{\log x}{x}}_{\substack{\downarrow x\to+\infty \\ 0}} = 0\cdot 0 = \boxed{0}$$

VIST A TEORIA

$$\lim_{x\to+\infty} \frac{x^2\sqrt{\log x}}{e^{2x}} = \lim_{x\to+\infty} \frac{x^2\, x\,\sqrt{\log x}}{e^{2x}\cdot x} =$$

$$x \underset{x>0}{=} \sqrt{x^2}$$

$$= \lim_{x\to+\infty} \frac{x^3}{e^{2x}}\cdot\frac{\sqrt{\log x}}{\sqrt{x^2}} =$$

$$= \lim_{x\to+\infty} \Big(\underbrace{\frac{x^3}{e^{2x}}}_{\substack{\downarrow x\to+\infty \\ 0}}\Big) \underbrace{\sqrt{\underbrace{\frac{\log x}{x^2}}_{\substack{\downarrow x\to+\infty \\ 0}}}}_{\substack{\downarrow x\to+\infty \\ \sqrt{0}=0}} = 0\cdot\sqrt{0} = \boxed{0}$$

En tot moment, estem fent servir (vist a TEORIA)

$$\lim_{x\to+\infty} \frac{x^n}{e^{nx}} = 0 \quad \text{i} \quad \lim_{x\to+\infty} \frac{\log x}{x^n} = 0.$$

2. Cont. en $x=-1$:

$$\frac{x^3-1}{1-x^4} \xrightarrow[x\to-1]{} \frac{-2}{0} = \infty!!$$ Més precisament:

$$1-x^4 = (1-x^2)(1+x^2) = (1-x)(1+x)(1+x^2).$$

$$\frac{x^3-1}{1-x^4} = \frac{x^3-1}{(1-x)(1+x)(1+x^2)} \longrightarrow \begin{cases} \dfrac{-2}{2\cdot\underset{\text{neg.}}{0}\cdot 2} = +\infty, & x\to-1^- \\ & (x<-1 \Leftrightarrow x+1<0) \\ \dfrac{-2}{2\cdot\underset{\text{pos.}}{0}\cdot 2} = -\infty & x\to-1^+ \\ & (x>-1 \Leftrightarrow x+1>0) \end{cases}$$

$$\Rightarrow \lim_{x\to-1} f(x) = \begin{cases} +\infty, & x\to-1^- \\ -\infty, & x\to-1^+ \end{cases}$$

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