ZONI FRANCESCO N° 323085

$$I = \int_1^e (\ln x)^2 \, dx = \qquad \frac{1}{I} = ? = \frac{e}{2(1-e)}$$

$$= 2\int_1^e \ln x \, dx = 2\left[\frac{1}{x}\right]_1^e = 2\left(\frac{1}{e} - 1\right) = \frac{2}{e} - 2 = \frac{2-2e}{e} = \frac{2(1-e)}{e}$$

$$\lim_{x \to +\infty} \left(1 - \frac{2}{x}\right)^{2x} = \lim_{x \to +\infty} \quad = \left(1 + \left[\left(\frac{1-\frac{2}{x}}{\frac{2}{x}}\right)^{\frac{2}{x}}\right)^{2x \cdot \frac{x}{2}} \leftarrow \text{No!}$$

$$= \lim_{x \to +\infty} \left[\left(\frac{1-\frac{2}{x}}{\frac{2}{x}}\right)^{\frac{2}{x}}\right]^{2x \cdot \frac{x}{2}} = e^{x^2} = e^{\infty} = \infty$$

4 $f(x) = e^x \cdot \operatorname{sen} x \qquad x_0 = \pi \qquad$ eq. tangente?

$$y - f(x_0) = f'(x_0)(x - x_0)$$

$$f(x_0) = f(\pi) = e^{\pi} \cdot \operatorname{sen}(\pi) = e^{\pi} \cdot 0 = 0$$

$$f'(x) = e^x \cdot \cos x$$

$$f'(x_0) = e^{\pi} \cdot \cos\pi = e^{\pi} \cdot 1 = e^{\pi}$$

$$y - 0 = e^{\pi}(x - \pi)$$

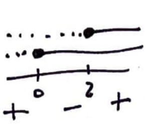
$$y = e^{\pi}x - e^{\pi}\pi$$

5 $\log_{\frac{1}{2}}(x^2 - x) \leq \log_{\frac{1}{2}}(x)$

$$x^2 - x \geq x$$

$$x^2 - 2x \geq 0$$

$$x(x-2) \geq 0 \qquad \begin{matrix} x \geq 0 \\ x \geq 2 \end{matrix}$$



$x \leq 0$
$\vee$
$x \geq 2$

(3) $\lim_{n} \operatorname{sen}\left(\frac{2}{n}\right)\left(\frac{3(n+1)! + n^2}{2(n)! + 9}\right) =$

$= \lim_{n} \operatorname{sen}\left(\frac{2}{n}\right)\left(\frac{3(n+1)\,n! + n^2}{2(n!) + 9}\right) =$

$= \lim_{n} \operatorname{sen}\left(\frac{2}{n}\right)\left(\underbrace{\frac{3\cancel{n!}}{2\cancel{n!}}}_{\to \frac{3}{2}} \; \frac{(n+1) + \overbrace{\frac{n^2}{3n!}}^{\to 0}}{1 + \underbrace{\frac{9}{n!}}_{\to 0}}\right) =$

$= \lim_{n} \operatorname{sen}\left(\frac{2}{n}\right) \cdot \left(\frac{3}{2} \cdot \frac{(n+1)}{1}\right) = 0 \cdot \frac{3}{2} \cdot \infty = 0$