

ALCOLO DERIVATE

(C)

$$20) y = \frac{3x}{(2x-1)^3} \quad y' = \frac{3(2x-1)^3 - 3x \cdot 3(2x-1)^2 \cdot 2}{(2x-1)^6} = \frac{6x-3-18x}{(2x-1)^4} =$$

$$= \frac{-3-12x}{(2x-1)^4} = \frac{-3(1+4x)}{(2x-1)^4}$$

$$21) y = \frac{x e^{-x} + 4}{x} \quad y' = \frac{(e^{-x} - x e^{-x}) \cdot x - x e^{-x} - 4}{x^2} =$$

$$= \frac{x e^{-x} - x^2 e^{-x} - x e^{-x} - 4}{x^2} = -e^{-x} - \frac{4}{x^2}$$

$$22) y = \ln \frac{1-e^x}{e^x} + \frac{1}{e^x-1} \quad y' = \frac{D\left(\frac{1-e^x}{e^x}\right)}{\frac{1-e^x}{e^x}} + \frac{-e^x}{(e^x-1)^2} =$$

$$= \frac{-e^x(e^x) - e^x(1-e^x)}{e^{2x}} \cdot \frac{e^x}{1-e^x} - \frac{e^x e^x}{(e^x-1)^2} =$$

$$= \frac{-e^{2x} - e^x + e^{2x}}{e^x(1-e^x)} - \frac{e^x}{(1-e^x)^2} = \frac{-e^x(1-e^x) - e^{2x}}{e^x(1-e^x)^2} =$$

$$= \frac{e^x(-1 + e^x - e^x)}{e^x(1-e^x)^2} = \frac{-1}{(1-e^x)^2}$$

$$23) y = \frac{x^3 - 2x^2 + 1}{(x-1)^2} + 2 \ln(x-1)$$

$$y' = \frac{(3x^2 - 4x)(x-1)^2 - (x^3 - 2x^2 + 1) \cdot 2(x-1)}{(x-1)^4} + 2 \cdot \frac{1}{x-1} =$$

$$= \frac{3x^3 - 3x^2 - 4x^2 + 4x - 2x^3 + 4x^2 - 2}{(x-1)^3} + \frac{2}{x-1} =$$

$$\frac{x^3 - 3x^2 + 4x - 2}{(x-1)^3} + \frac{2}{x-1} = \frac{x^3 - 3x^2 + 4x - 2 + 2x^2 - 4x + 2}{(x-1)^3} =$$

$$= \frac{x^3 - 3x^2 + 2x^2}{(x-1)^3} = \frac{x^3 - x^2}{(x-1)^3} = \frac{x^2(x-1)}{(x-1)^3} = \frac{x^2}{(x-1)^2}$$