9) g) $\int \ln(x^2+1)\,dx =$

$\int f'(x)\,g(x) = f(x)\,g(x) - \int f(x)\,g'(x)\,dx$

$= x\ln(x^2+1) - \int \frac{2x^2}{x^2+1}\,dx = x\ln(x^2+1) - \left(\int 2\,dx + 2\int \frac{1}{x^2+1}\,dx\right)$

$= x\ln(x^2+1) - 2x - \left(\frac{x^{-1}}{-1}\right) = x\ln(x^2+1) - 2x + 2\arctg(x) + C,\ C \in \mathbb{R}$

$-\frac{1}{x}$

Divisão:

$$\begin{array}{l|l} 2x^2 & x^2+1 \\ \hline -2x^2\ \ -2 & 2 \\ \hline \quad -2 & \end{array}$$

$\frac{N(x)}{D(x)} = Q(x) + \frac{R(x)}{D(x)}$

g) h) $\int x \, \mathrm{arctg}(x)\, dx =$

$$= \frac{x^2 \mathrm{arctg}(x)}{2} - \frac{1}{2}\int \frac{x^2}{1+x^2}\, dx =$$

$$= \frac{x^2 \mathrm{arctg}(x)}{2} - \frac{1}{2}\int 1 + \frac{1}{x^2-1}\, dx$$

$$= \frac{x^2 \mathrm{arctg}(x)}{2} - \frac{1}{2}\left(\int 1\, dx + \int \frac{1}{x^2-1}\, dx\right) =$$

$$\frac{x^2 \mathrm{arctg}(x)}{2} + \frac{1}{2}x \quad \frac{1}{2}\mathrm{arctg}(x) + C, C \in \mathbb{R}$$

Havia um erro na foto anterior

$f(x) = \mathrm{arctg}(x)$

$\rightarrow f'(x) = \frac{1}{1+x^2}$

Divisão

$$\begin{array}{r|l} x^2 & x^2-1 \\ \cline{2-2} -x^2+1 & +1 \\ \hline +1 & \end{array}$$

$$\frac{N(x)}{D(x)} = Q(x) + \frac{R(x)}{D(x)}$$