9) b) $\int \underbrace{x}_{f(x)} \underbrace{\cos(x)}_{g'(x)} dx \overset{(1)}{=} x \cdot \operatorname{sen}(x) + \int \operatorname{sen}(x)\, dx =$

$= x \operatorname{sen}(x) - \cos(x) + C, C \in \mathbb{R}$

Caux: (1)

$f(x) = x \to f'(x) = x' = 1$

$g'(x) = \cos(x) \Rightarrow g(x) = \operatorname{sen}(x)$

c) $\int \underbrace{x^2}_{f(x)} \underbrace{\cos(x)}_{g'(x)} dx \ (1)$ $\int f'(x) g(x) = f(x) g(x) - \int f(x) g'(x) dx$

$= x^2 \operatorname{sen}(x) - \int \underbrace{2x}_{f(x)} \cdot \underbrace{\operatorname{sen}(x)}_{u'(x)} dx$

$= x^2 \operatorname{sen}(x) - (-2x \cdot \cos(x) - \int -2 \cdot \cos(x)$

$= x^2 \operatorname{sen}(x) - (-2x \cos(x) + 2 \operatorname{sen}(x)) + C, C \in$

$= x^2 \operatorname{sen}(x) + 2x \cos(x) - 2 \operatorname{sen}(x) + C, C \in \mathbb{R}$

Caux. (1)

$f(x) = x^2 \to f(x) = 2x$

$g(x) = \cos(x) \to g(x) = \operatorname{sen}(x)$

d)

$$\int \underbrace{e^{-3x}}_{f'(x)} \underbrace{(2x+3)}_{g(x)} dx =$$

$$e^{-3x}(2x+3) - \tfrac{2}{3}\int e^{-3x} \cdot \cancel{2}\cancel{x} \tfrac{-3}{\cancel{2}} =$$

$$e^{-3x}(2x+3) + \tfrac{2}{3} e^{-3x} + C, C \in \mathbb{R}$$

C. aux:

$f'(x) = e^{-3x} \to f(x) = e^{-3x}$

$g(x) = (2x+3) \to g'(x) = (2x+3)' =$

$= 2x$

e)

$$\int \underbrace{1}_{g'(x)} \cdot \underbrace{\ln^2(x)}_{f(x)} =$$

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

$$x \cdot \ln^2(x) - \int \cancel{x} \cdot 2 \cdot \ln(x) \tfrac{1}{\cancel{x}} = x\ln^2(x) - 2\int \ln(x)$$

$$= x\ln^2(x) - 2(x\ln(x) - x) + C, C \in \mathbb{R}$$

$f(x) = \ln^2(x) \to f'(x) = 2 \cdot \ln(x) \cdot \frac{1}{x}$

$g(x) = 1 \to g(x) = x$

ex d

d)

$$\int \underbrace{1}_{g'(x)} \underbrace{\ln|x|}_{f(x)} dx = x \cdot \ln(x) - \int \cancel{x} \cdot \tfrac{1}{\cancel{x}} dx$$

$$= x\ln x - x + C, C \in \mathbb{R},$$

C. AUX

$f(x) = \ln|x| = f'(x) = \frac{1}{x}$

$g'(x) = 1 \Rightarrow g(x) = x$

g) $\int \underbrace{1}_{g'(x)} \underbrace{\ln(x^2+1)}_{f(x)}\,dx =$

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

9 em STAND-BY

$= x\ln(x^2+1) - \int \underbrace{x}_{h'(x)} \cdot \underbrace{\frac{2x}{x^2+1}}_{M(x)}$

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

Caux 0)

$g'(x) = x \to g(x) = \frac{x^2}{2}$

$M(x) = \frac{2x}{x^2+1} \to M'(x) = \frac{2x^2+1-4x^2}{(x^2+1)^2} = \frac{2x^2+1}{(x^2+1)^2}$

C. AUXIL

$g'(x) = 1 \to g(x) = x$

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

Caux 3

$\int \frac{x^2}{2}\cdot\frac{2x^2+1}{(x^2+1)^2}\,dx = \int \frac{2x^4+x^2}{2\cdot(x^4+2x^2+1)}\,dx$

$\int \frac{2x^4+x^2}{2x^4+4x^2+2}\,dx = \int \frac{\cancel{x^2}(2x^2+1)}{\cancel{x^2}(2x^2+4+\frac{2}{x^2})}\,dx$

$= \int$

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

h) $\int \underbrace{x}_{g'(x)} \underbrace{\operatorname{arctg}(x)}_{f(x)} =$

$\frac{x^2}{2}\operatorname{arctg}(x) - \int \frac{x^2}{2} \cdot \frac{1}{\sqrt{1-x^2}} =$

$= \frac{x^2 \operatorname{arctg}(x)}{2} - \frac{1}{2}\int \frac{x^2}{\sqrt{1-x^2}} = \frac{x^2 \operatorname{arctg}(x)}{2} - \frac{1}{2}\int x^2 \cdot (1-x^2)^{\frac{1}{2}}$

Acabo o 9 a seguir

C. Aux

$f(x) = \operatorname{arctg}(x) \to f'(x) =$

$= \frac{1}{\sqrt{1-x^2}}$

$g'(x) = x \Rightarrow g(x) = \frac{x^2}{2}$