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Questao 5

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$x^2 = u$ $\quad u^2 + 5u + 4 = (u+1)(u+4) = (x^2+1)(x^2+4)$

$$\int_0^1 \frac{2x^3+5x}{x^4+5x^2+4} \Rightarrow \frac{(2x^3+5)}{(x^2+1)(x^2+4)} =$$

$$\frac{2x^3+5x}{(x^2+1)(x^2+4)} = \frac{Ax+B}{(x^2+1)} + \frac{(Cx+D)}{(x^2+4)} = \frac{(Ax+B)(x^2+4)+(Cx+D)(x^2+1)}{x^4+5x^2+4}$$

$$2x^3+5x = (Ax+B)(x^2+4) + (Cx+D)(x^2+1)$$

$$2x^3+5x = Ax^3+4Ax+Bx^2+4B+Cx^3+Cx+Dx^2+D$$

$$2x^3+5x = Ax^3+Cx^3+Bx^2+Dx^2+4Ax+Cx+D+4B$$

$$2x^3+5x = (A+C)x^3+(B+D)x^2+(4A+C)x+(D+4B)$$

$$\begin{cases} 2 = A+C \\ B+D=0 \\ 4A+C=5 \\ D+4B=0 \end{cases}$$

$2 - A = C$

$4A + 2 - A = 5$

$3A + 2 = 5$

$3A = 3$

$A = 1$

$A = 1$
$B = 0$
$C = 1$
$D = 0$

$B + D = 0$

$D = -B$

$-B + 4B = 0$

$B = 0$

$$\int \frac{x}{x^2+1} + \int \frac{0}{x^2+1} + \int \frac{x}{x^2+4} + \int \frac{0}{x^2+4}$$

$$\frac{1}{2}\ln(x^2+1) + \frac{1}{2}\ln(x^2+4) + C$$

$$\left(\frac{1}{2}\ln(2) + \frac{1}{2}\ln(5)\right) - \left(\frac{1}{2}\ln(1) + \frac{1}{2}\ln(\quad\right.$$

$1,15$ $\quad - \quad 0,69$

$$\simeq 0,45814$$