Trabalho Ferramentas Matemáticas CURSO: ENGENHARIAS	
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1) Determine a integral indefinida $\int (sen(x) + \cos(x))dx$ e faça a verificação derivando o resultado.

$\int \sin(x)dx = -\cos(x)$

$\int \sin(x)dx + \int \cos(x)dx$ = $\int \cos(x)dx = \sin(x)$ = $-\cos(x) + \sin(x) + C$

$\frac{d}{dx}(\cos(x)) = -\sin(x)$

$\frac{d}{dx}(\sin(x)) = \cos(x)$

$-\frac{d}{dx}(\cos(x)) + \frac{d}{dx}(\sin(x)) + \frac{d}{dx}(C)$ = $\frac{d}{dx}(C) = 0$ $\sin(x) + \cos(x)$

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2) Calcule as integrais indefinidas utilizando o método da substituição.

a) $\int \frac{1}{4+3x}dx$

$= \int \frac{1}{3u}du \qquad = \frac{1}{3} \cdot \int \frac{1}{u}du \qquad = \frac{1}{3}\ln|u| \qquad = \frac{1}{3}\ln|4+3x| \qquad = \frac{1}{3}\ln|4+3x| + C$

b) $\int (3x^2 + 1)^3 dx$

$$= \int \frac{(u^2+1)^3}{\sqrt{3}}du \qquad = \frac{1}{\sqrt{3}} \cdot \int (u^2+1)^3 du \qquad = \frac{1}{\sqrt{3}} \cdot \int u^6 + 3u^4 + 3u^2 + 1du$$

$$= \frac{1}{\sqrt{3}}\left(\int u^6 du + \int 3u^4 du + \int 3u^2 du + \int 1du\right) \qquad = \frac{1}{\sqrt{3}}\left(\frac{u^7}{7} + \frac{3u^5}{5} + u^3 + u\right)$$

$$= \frac{1}{\sqrt{3}}\left(\frac{(\sqrt{3}x)^7}{7} + \frac{3(\sqrt{3}x)^5}{5} + (\sqrt{3}x)^3 + \sqrt{3}x\right)$$

$$= \frac{1}{35}x\left(135x^6 + 189x^4 + 105x^2 + 35\right)$$

$$= \frac{1}{35}x\left(135x^6 + 189x^4 + 105x^2 + 35\right) + C$$

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3) Calcule as integrais utilizando o método da integração por partes:

a) $\int xe^{-5x}dx$

$$\int \frac{e^u u}{25}du = \frac{1}{25} \cdot \int e^u u du = \frac{1}{25}\left(e^u u - \int e^u du\right) = \frac{1}{25}\left(e^u u - e^u\right)$$

$$\frac{1}{25}\left(e^{-5x}(-5x) - e^{-5x}\right) = \frac{1}{25}\left(-5e^{-5x}x - e^{-5x}\right) = \frac{1}{25}\left(-5e^{-5x}x - e^{-5x}\right) + C$$

b) $\int (2x+1)sen(x)dx$

$$-\cos(x)(2x+1) - \int -2\cos(x)dx = -\cos(x)(2x+1) - (-2\sin(x))$$

$$-\cos(x)(2x+1) + 2\sin(x) + C$$

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4) Calcule a integral $\int \frac{2x+1}{(x+1)(x-1)^2}dx$ $= \frac{2x}{(x+1)(x-1)^2} + \frac{1}{(x+1)(x-1)^2}$

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

$$= \frac{1}{4}\ln|x+1| - \frac{1}{4}\ln|x-1| - \frac{1}{2(x-1)} =$$

$$= -\frac{1}{2}\ln|x+1| + \frac{1}{2}\ln|x-1| - \frac{1}{x-1} + \frac{1}{4}\ln|x+1| - \frac{1}{4}\ln|x-1| - \frac{1}{2(x-1)}$$ div

$$-\frac{1}{4}\ln|x+1| + \frac{1}{4}\ln|x-1| - \frac{1}{x-1} - \frac{1}{2(x-1)}$$

$$= -\frac{1}{4}\ln|x+1| + \frac{1}{4}\ln|x-1| - \frac{1}{x-1} - \frac{1}{2(x-1)}$$

$$= -\frac{1}{4}\ln|x+1| + \frac{1}{4}\ln|x-1| - \frac{1}{x-1} - \frac{1}{2(x-1)} + C$$

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5) Calcule a integral definida $\int_1^3 (x^2 + 3x + 2)dx$

$$\int_1^3 x^2dx + \int_1^3 3xdx + \int_1^3 2dx = \int_1^3 x^2dx = \frac{26}{3} = \int_1^3 2dx = 4 = \frac{26}{3} + 12 + 4 = \frac{74}{3}$$

6) Calcule o valor da integral $\int_0^1 \frac{x^2}{(x^3+1)^5}dx =$

$$\int_1^2 \frac{1}{3u^5}du = \frac{1}{3} \cdot \int_1^2 \frac{1}{u^5}du = \frac{1}{3} \cdot \int_1^2 u^{-5}du = \frac{1}{3}\left[\frac{u^{-5+1}}{-5+1}\right]_1^2 = \frac{1}{3}\left[-\frac{1}{4u^4}\right]_1^2 = \frac{1}{3} \cdot \frac{15}{64} = \frac{5}{64}$$