

Lista 1 - Atividade em Sala - 06/03 - Cálculo 2

I) Resolva as integrais indefinidas pelo Método da Substituição

$$a) \int x \sqrt{x^2+2} dx = \int u^{1/2} \frac{du}{2} = \frac{1}{2} \frac{u^{3/2}}{3/2} =$$

$$u = x^2 + 2$$
$$du = 2x dx \rightarrow \frac{du}{2} = x dx$$

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

$$b) \int (3x^2+2) \cdot \cos(x^3+2x) dx = \int \cos u du =$$

$$u = x^3 + 2x$$
$$du = 3x^2 + 2 dx$$

$$= \sin(x^3+2x) + C$$

$$c) \int \frac{(3x^2+1)}{x^3+x} dx = \int \frac{du}{u} = \ln|x^3+x| + C$$

$$u = x^3 + x$$
$$du = 3x^2 + 1 dx$$

2) Resolva as integrais indefinidas pelo Método "Por Partes".

$$a) \int x^2 \cdot \ln(x) dx = \frac{x^3}{3} \cdot \ln(x) - \int \frac{x^3}{3} \cdot \frac{1}{x} dx =$$

$$u = \ln(x) \rightarrow du = \frac{1}{x} dx$$

$$dv = x^2 dx \rightarrow v = \int x^2 dx = \frac{x^3}{3}$$

$$= \frac{x^3}{3} \ln(x) - \int \frac{x^2}{3} dx = \frac{x^3}{3} \ln(x) - \frac{x^3}{9} + C$$

$$b) \int \sqrt{x} \ln(x) dx = \frac{2}{3} x^{3/2} \cdot \ln(x) - \frac{2}{3} \int x^{3/2} \cdot \frac{1}{x} dx =$$

$$u = \ln(x) \rightarrow du = \frac{1}{x} dx$$

$$dv = x^{1/2} dx \Rightarrow v = \int x^{1/2} dx = \frac{x^{3/2}}{3/2} = \frac{2}{3} x^{3/2}$$

$$= \frac{2x^{3/2}}{3} \cdot \ln(x) - \frac{2}{3} \int x^{1/2} dx = \frac{2x^{3/2}}{3} \cdot \ln(x) - \frac{2 \cdot 2}{3 \cdot 3} x^{3/2} =$$

$$= \frac{2x^{3/2}}{3} \cdot \ln(x) - \frac{4}{9} x^{3/2} + C$$

$$c) \int e^{3x} \cos 4x \, dx = \frac{e^{3x} \operatorname{sen}(4x)}{4} - 3 \int \operatorname{sen}(4x) \cdot e^{3x} \, dx =$$

$$u = e^{3x} \rightarrow du = 3e^{3x} \, dx$$

$$dv = \cos 4x \, dx \rightarrow v = \int \cos 4x \, dx = \frac{1}{4} \operatorname{sen}(4x)$$

$$u = e^{3x} \rightarrow du = 3e^{3x} \, dx$$

$$dv = \operatorname{sen} 4x \, dx \rightarrow v = -\frac{\cos 4x}{4}$$

$$= \frac{e^{3x} \operatorname{sen}(4x)}{4} - 3 \left(\frac{e^{3x} \cos 4x}{4} + \frac{3}{4} \int \cos 4x e^{3x} \, dx \right)$$

$$\int e^{3x} \cos 4x \, dx = \frac{e^{3x} \operatorname{sen} 4x}{4} + \frac{3}{16} e^{3x} \cos 4x - \frac{9}{16} \int \cos 4x e^{3x} \, dx$$

$$\int e^{3x} \cos 4x \, dx = \frac{e^{3x} \operatorname{sen} 4x}{4} + \frac{3}{16} e^{3x} \cos 4x$$

$$\int e^{3x} \cos 4x \, dx = \frac{16}{25} \left(\frac{e^{3x} \operatorname{sen} 4x}{4} + \frac{3}{16} e^{3x} \cos 4x \right) + C$$

$$\int e^{3x} \cos 4x \, dx = \frac{4 e^{3x} \operatorname{sen} 4x}{25} + \frac{3 e^{3x} \cos 4x}{25} + C$$