

Trabalho 7 (10 pontos)

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1. Calcule

(a) (1 ponto)

$$\int (\sqrt{x} + \frac{1}{x^2}) dx$$

(b) (1 ponto)

$$\int \frac{e^x + e^{-x}}{2} dx$$

(c) (2 pontos)

$$\int \sqrt{3x - 2} dx$$

(d) (2 pontos)

$$\int xe^{-x^2} dx$$

(e) (2 pontos)

$$\int \sin^5 x \cos x dx$$

(f) (2 pontos)

$$\int \frac{x^2}{(1 + x^3)^2} dx$$

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1) Calcule

$$a) \int \left(\frac{\sqrt{x} + 1}{x^2} \right) dx$$

$$\int \sqrt{x} dx + \int \frac{1}{x^2} dx$$

$$\int x^{\frac{1}{2}} dx + \int x^{-2} dx$$

$$\left[\frac{x^{\frac{1}{2}+1}}{\frac{1}{2}+1} + C \right] + \left[\frac{x^{-2+1}}{-2+1} + C \right]$$

$$\left[\frac{x^{\frac{3}{2}}}{\frac{3}{2}} + C \right] + \left[\frac{x^{-1}}{-1} + C \right]$$

$$\frac{2}{3} \sqrt{x^3} + x^{-1} + C$$

$$\frac{2}{3} \sqrt{x^3} - \frac{1}{x} + C$$

$$\frac{2}{3} \sqrt{x^3} - \frac{1}{x} + C$$

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Resposta: $\frac{2\sqrt{x^3} - 1}{3x} + C$

b) $\int \frac{e^x + e^{-x}}{2} dx$

$\int \frac{e^x}{2} dx + \int \frac{e^{-x}}{2} dx$

$\left[\frac{1}{2} \int e^x dx \right] + \left[\frac{1}{2} \cdot \int \frac{1}{e^x} e^x dx \right]$

$\frac{1}{2} \cdot e^x + C + \frac{1}{2} \cdot -e^{-x} + C$

$\frac{1}{2} e^x - \frac{1}{2} e^{-x} + C$

$e^x - e^{-x} + C$

Resposta: $\frac{e^x - 1}{2e^x} + C$

c) $\int \sqrt{3x-2} dx$

u = 3x - 2

du = (3x - 2)' dx

du = 3dx

dx = du/3

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$$\int \sqrt{3x-2} dx = \int \sqrt{u} \cdot \frac{du}{3}$$

$$1. \int \sqrt{u} \cdot \frac{du}{3} = \frac{1}{3} \frac{u^{\frac{1}{2}+1}}{1+1} + C$$

$$= \frac{1}{3} \frac{u^{\frac{3}{2}}}{3} + C = \frac{1}{3} \cdot \frac{2}{3} \sqrt{u^3} + C$$

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

Resposta: $\frac{2}{9} \sqrt{(3x-2)^3} + C$

d) $\int x e^{-x^2} dx$

$$u = -x^2$$

$$du = (-x^2)' dx$$

$$du = -2x dx$$

$$-x dx = \frac{du}{2}$$

$$x dx = -\frac{du}{2}$$

$$\int e^u \cdot -\frac{du}{2} = -\frac{1}{2} \int e^u \cdot du =$$

$$= -\frac{1}{2} e^u + C$$

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$$= -1 e^{-x^2} + C$$

2

Resposta: $-1 e^{-x^2} + C$

3

e) $\int \sin^5 x \cos x dx$

$$u = \sin x$$

$$du = (\sin x)' dx$$

$$du = \cos x dx$$

$$\int u^5 du = u^6 + C$$

6

$$= \frac{1}{6} \sin^6 x + C$$

6

6

Resposta: $\frac{1}{6} \sin^6 x + C$

f) $\int \frac{x^2}{(1+x^3)^2} dx$

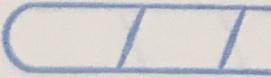
$$u = 1+x^3$$

$$du = (1+x^3)' dx$$

$$du = 3x^2 dx$$

$$x^2 dx = \frac{1}{3} du$$

3



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$$\frac{\int \frac{1}{u^3} du}{3} = \frac{1}{3} \int \frac{1}{u^2} du$$

$$= -\frac{1}{u} + 18 = -\frac{1}{(1+x^3)} + 18$$

Resposta: $-\frac{1}{(1+x^3)} + 18$