UNIVERSIDADE DO SUL DE SANTA CATARINA1
Curso de Engenharia civil e Computação
Disciplina: Integrais
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Avaliação

1) Resolva as integrais:

a) $\int (x^6 - 3x^{1/7} + \sqrt[7]{x^2})dx =$

b) $\int \left(x^7 \sqrt{x^7}\right)dx =$

c) $\int \frac{x^5 + 3x}{x^5}dx =$

d) $\int \frac{x^3 + 2x^{-2} + 5}{\sqrt[5]{x}}dx =$

e) $\int (3senx + \frac{4}{\sqrt{x}})\,dx =$

2) Resolva pelo método da substituição:

a) $\int \frac{x-6}{x+5}dx =$

b) $\int \frac{x^7}{x^8+2}dx =$

c) $\int \cos^4 x\,senx\,dx =$

d) $\int sen(2x-4)dx =$

3) Resolva por partes as integrais:

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

b) $\int xsen(2x)dx =$

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10

1-a) $\int (x^6 - 3x^{\frac{1}{7}} + \sqrt[7]{x^2})\,dx = \int x^6\,dx - 3\int x^{\frac{1}{7}}\,dx + \int x^{\frac{2}{7}}\,dx$

$\frac{x^7}{7} - \frac{3x^{\frac{8}{7}}}{\frac{8}{7}} + \frac{x^{\frac{9}{7}}}{\frac{9}{7}} = \frac{x^7}{7} - \frac{7}{8}\cdot 3x^{\frac{8}{7}} + \frac{7}{9}x^{\frac{9}{7}} =$

$\boxed{\frac{x^7}{7} - \frac{21}{8}x^{\frac{8}{7}} + \frac{7}{9}x^{\frac{9}{7}} + c}$

1-b) $\int (x^7\sqrt{x^7})\,dx = \int (x^7 \cdot x^{\frac{7}{2}})\,dx = \int x^{\frac{21}{2}}\,dx = \frac{x^{\frac{23}{2}}}{23/2} + c =$

$\boxed{\frac{2}{23}x^{\frac{23}{2}} + c}$

1-c) $\int \frac{x^5 + 3x}{x^5}\,dx = \int \frac{x^5}{x^5}\,dx + \int \frac{3x}{x^5}\,dx = \int dx + 3\int x \cdot x^{-5}\,dx = \int dx + 3\int x^{-4}\,dx =$

$x + \frac{3x^{-3}}{-3} + c = x + \left(-\frac{1}{3}\cdot 3x^{-3}\right) = \boxed{x - x^{-3} + c}$

1-d) $\int \frac{x^3 + 2x^{-2} + 5}{\sqrt[5]{x}}\,dx = \int \frac{x^3}{x^{\frac{1}{5}}}\,dx + \int \frac{2x^{-2}}{x^{\frac{1}{5}}}\,dx + \int \frac{5}{x^{\frac{1}{5}}}\,dx =$

$\int x^3 \cdot x^{-\frac{1}{5}}\,dx + 2\int x^{-2}\cdot x^{-\frac{1}{5}}\,dx + 5\int x^{-\frac{1}{5}}\,dx = \int x^{\frac{14}{5}}\,dx + 2\int x^{-\frac{11}{5}} + 5\int x^{-\frac{1}{5}}\,dx =$

$$= \frac{x^{\frac{19}{5}}}{19/5} + \frac{2x^{-\frac{6}{5}}}{-6/5} + \frac{5x^{\frac{4}{5}}}{4/5} + c = \boxed{\frac{5}{19}x^{\frac{19}{5}} - \frac{10}{6}x^{\frac{-6}{5}} + \frac{25}{4}x^{\frac{4}{5}} + c}$$

1-e) $\int \left(3 \operatorname{sen} x + \frac{4}{\sqrt{x}}\right) dx = 3\int \operatorname{sen} x \, dx + 4\int x^{-\frac{1}{2}} dx = 3(-\cos x) + \frac{4x^{\frac{1}{2}}}{\frac{1}{2}} + c =$

$$\boxed{-3\cos x + 8x^{\frac{1}{2}} + c}$$

2-a) $\int \frac{x-6}{x+5} dx = \int 1 + \frac{11}{x+5} dx = \int dx - \int \frac{11}{x-5} dx = \boxed{x - 11 \ln(x-5) + c}$

$\rightarrow u = x-5$

$du = dx$

$\rightarrow = 11 \int \frac{du}{u} = 11 \ln u + c$

$\underline{11 \ln(x-5) + c}$

2-b) $\int \frac{x^7}{x^8+2} dx = \int \frac{du/8}{u} = \int \frac{\frac{1}{8} du}{u} = \frac{1}{8}\int \frac{du}{u} = \frac{1}{8} \ln u + c =$

$u = x^8 + 2$

$du = 8x^7 dx$

$\frac{du}{8} = x^7 dx$

$$= \boxed{\frac{1}{8} \ln(x^8+2) + c}$$

$2\text{-}c)\ \int \cos^4 x \ \text{sen}\, x \, dx = \int u^4(-du) = -1\int u^4 du = -1\frac{u^5}{5} + c = -1 \cdot \frac{1}{5} u^5 + c =$

$u = \cos x$

$du = -\text{sen}\, x \, dx$

$-du = \text{sen}\, x\, dx$

$= -\frac{1}{5} u^5 + c = \boxed{-\frac{1}{5}\cos^5 x + c}$

$2\text{-}d)\ \int \text{sen}(2x-4)\,dx = \boxed{-\frac{1}{2}\cos(2x-4) + c}$

Prova real

$u = 2x-4$

$du = 2dx$

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

$= \int \text{sen}\, u \frac{du}{2} = \frac{1}{2}\int \text{sen}\, u\, du = \frac{1}{2}(-\cos u + c) =$

$= -\frac{1}{2}\cos u + c = \boxed{-\frac{1}{2}\cos(2x-4) + c}$

$3\text{-}a)\ \int 5x e^{-5x} dx = 5x \cdot \left(-\frac{1}{5}e^{-5x}\right) + \int \frac{1}{5} e^{-5x} 5dx =$

$u = 5x$

$du = 5dx$

$dv = e^{-5x} dx$

$v = -\frac{1}{5}e^{-5x} + c$

$\int e^{-5x} dx = \frac{1}{-5} e^{-5x} + c$

$= -\frac{5x}{5} e^{-5x} + \int e^{-5x} dx = \boxed{-xe^{-5x} - \frac{1}{5} e^{-5x} + c}$

3-b) $\int x \operatorname{sen}(2x)\,dx = x\left(-\frac{1}{2}\cos 2x\right) + \int \frac{1}{2}\cos 2x\,dx =$

$u = x$

$du = dx$

$dv = \operatorname{sen}(2x)\,dx$

$v = -\frac{1}{2}\cos 2x$

$\downarrow$

$\int \operatorname{sen}(2x)\,dx = -\frac{1}{2}\cos 2x + c$

$$= -\frac{x}{2}\cos 2x + \frac{1}{2}\int \cos 2x\,dx =$$

$$= -\frac{x}{2}\cos 2x + \frac{1}{2}\cdot\frac{1}{2}\operatorname{sen} 2x + c =$$

$$\boxed{-\frac{x}{2}\cos 2x + \frac{1}{4}\operatorname{sen} 2x + c}$$