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Nombre del trabajo: Problemario

Materia: Matematicas Aplicada

Grado: 6º cuatrimestre

Grupo: Recursos Humanos

Ejercicios

1.- $\int x^2 \sin x \, dx$

$= x^2 (-\cos(x)) - \int -\cos(x) \, 2x \, dx$

$= x^2 (-\cos(x)) - 1 (-2) \int \cos(x) x \, dx$

$= x^2 (-\cos(x)) + 2 \int x \cos(x) \, dx$

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

$= x^2 (-\cos(x)) + 2 (x \sin(x)) - (-\cos(x)))$

$= x^2 (\cos(x)) + 2 (x \sin(x)) + 2\cos x$

$= -x^2 \cos x + 2x \sin x + 2\cos x + C$

$= -x^2 \cos x + 2x \sin x + 2\cos x + C$

2.- $\int x^3 e^{2x} \, dx$

$= x^3 \frac{e^{2x}}{2} - \int \frac{e^{2x}}{2} 3x^2 \, dx$

$= x^3 \frac{e^{2x}}{2} - \frac{3}{2} \int e^{2x} x^2 \, dx$

$= x^3 \frac{e^{2x}}{2} - \frac{3}{2} (x^2 \frac{e^{2x}}{2} - \int \frac{e^{2x}}{2} 2x \, dx)$

$= x^3 \frac{e^{2x}}{2} - \frac{3}{2} (x^2 \frac{e^{2x}}{2} - \int e^{2x} x \, dx)$

$= x^3 \frac{e^{2x}}{2} - \frac{3}{2} (x^2 \frac{e^{2x}}{2} - (x \frac{e^{2x}}{2} - \int \frac{e^{2x}}{2} \, dx))$

$= x^3 \frac{e^{2x}}{2} - \frac{3}{2} (x^2 \frac{e^{2x}}{2} - (x \frac{e^{2x}}{2} - \frac{1}{2} \int e^{2x} \, dx))$

$= x^3 \frac{e^{2x}}{2} - \frac{3}{2} (x^2 \frac{e^{2x}}{2} - (x \frac{e^{2x}}{2} - \frac{1}{2} (\frac{1}{2} e^{2x})))$

$= \frac{x^3 e^{2x}}{2} - \frac{3x^2 e^{2x}}{2} - \frac{3x e^{2x}}{4} - \frac{3e^{2x}}{8}$

$= \frac{x^3 e^{2x}}{2} - \frac{3x^2 e^{2x}}{4} - 3x e^{2x} - \frac{3e^{2x}}{8} + e$

3.

$$= \int x^2 \sqrt{(1-x)}\, dx$$

$$= \int -t^2 \sqrt{t} + 2t\sqrt{t} - \sqrt{t}\, dt$$

$$= \int -t^2(t^{\frac{1}{2}}) + 2t(t^{\frac{1}{2}}) - t^{\frac{1}{2}}\, dt$$

$$= \int -t^{e}(t^{\frac{1}{2}}) + 2t(t^{\frac{1}{2}}) - t^{\frac{1}{2}}\, dt$$

$$= \int -t^{\frac{5}{2}} + 2t^{\frac{3}{2}} - t^{\frac{1}{2}}\, dt$$

$$= -\int t^{\frac{5}{2}}\, dt + \int 2t^{\frac{3}{2}}\, dt - \int t^{\frac{1}{2}}\, dt$$

$$= -\frac{2t^{\frac{7}{2}}}{7} + \frac{4t^{\frac{5}{2}}}{5} - \frac{2t^{\frac{3}{2}}}{3}$$

$$= \frac{2(1-x)^3 (\sqrt{1-x})}{7} + \frac{4(\sqrt{1-x})^5}{5} - \frac{2(1-x)(\sqrt{1-x})^3}{3}$$

$$= -\frac{2\sqrt{1-x}(1-3x+3x^2-x^3)}{7} + \frac{4\sqrt{1-x}(1-2x+x^2)}{5} - \frac{2(1-x)(\sqrt{1-x})^3}{3}$$

$$= -\frac{2\sqrt{1-x}(1-3x+3x^2-x^3)}{7} + \frac{4\sqrt{1-x}(1-2x+x^2)}{5} - \frac{2(1-x)(\sqrt{1-x})^3}{3} + c$$

4. $\int e^{ax}\cos bx\, dx$

$$= \cos bx(\tfrac{1}{a}e^{ax}) - \int \tfrac{1}{a}e^{ax}(-b\,\operatorname{sen} bx)\, dx$$

$$= \tfrac{1}{a}e^{ax}\cos bx + \tfrac{b}{a}\int e^{ax}\operatorname{sen} bx\, dx$$

$$= \tfrac{1}{a}e^{ax}\cos bx + \tfrac{b}{a}(\tfrac{1}{a}e^{ax}\operatorname{sen} bx - \tfrac{b}{a}\int e^{ax}\cos bx\, dx)$$

$$= \tfrac{1}{a}e^{ax}\cos bx + \tfrac{b}{a}(\tfrac{1}{a}e^{ax}\operatorname{sen} bx - \tfrac{b}{a}\int e^{ax}\cos bx\, dx$$

$$= \tfrac{1}{a}e^{ax}\cos bx + \tfrac{b}{a^2}e^{ax}\operatorname{sen} bx - \tfrac{b^2}{a^2}\int e^{ax}\cos bx\, dx$$

$$= \int e^{ax}\cos bx\, dx + \tfrac{b^2}{a^2}\int e^{ax}\cos bx\, dx = \tfrac{1}{a}e^{ax}\cos bx + \tfrac{b}{a^2}e^{ax}\operatorname{sen} bx$$

$$= \frac{a^2+b^2}{a^2}\int e^{ax}\cos bx\, dx = \tfrac{1}{a}e^{ax}\cos bx + \tfrac{b}{a^2}\operatorname{sen} bx$$

$$= \int e^{ax}\cos bx\, dx = \frac{a^2}{a^2+b^2}(\tfrac{1}{a}e^{ax}\cos bx + \tfrac{b}{a^2}e^{ax}\operatorname{sen} bx)$$

$$= \int e^{ax}\cos bx\, dx = \frac{a}{a^2+b^2}e^{ax}\cos bx + \tfrac{b}{a^2+b^2}e^{ax}\operatorname{sen} bx$$

$$= \int e^{ax}\cos bx\, dx = \frac{a}{a^2+b^2}e^{ax}\cos bx + \frac{b}{a^2+b^2}e^{ax}\operatorname{sen} bx + c$$

$$5.- \int Sen^3 x \, dx$$

$$= \int sen^2 x \, senx \, dx$$

$$= \int (1-cos^2 x) \, sen(x) \, dx$$

$$= \int (sen(x) - cos^2 x \, sen(x)) \, dx$$

$$= \int sen(x) \, dx - \int cos^2 x \, sen(x) \, dx$$

$$= -cos(x) + \int cos^2 x \, (-sen(x)) \, dx$$

$$= -cos(x) + \frac{cos^3 x}{3}$$

$$= -cos(x) + \frac{cos^3 x}{3} + C$$

$$6.- \int sen \, 3x \, cos \, 2x \, dx$$

$$= \int \frac{1}{2} (sen \, 5x + senx) \, dx$$

$$= \frac{1}{2} \int sen \, 5x + sen \, x \, dx$$

$$= \frac{1}{2} \int sen \, 5x \, dx + \int sen \, x \, dx$$

$$= \frac{1}{2} \left(\frac{cos \, 5x}{5} - cos \, x \right)$$

$$= \frac{cos \, 5x}{10} - \frac{cos \, x}{2}$$

$$= \frac{cos \, 5x}{10} - \frac{cos \, x}{2}$$

$$= \frac{cos \, 5x}{10} - \frac{cos \, x}{2} + C$$

7. $\int \text{sen}(\ln x)\,dx$

$= \text{sen}(t)\,e^t - \int e^t \cos(t)\,dt$

$= \text{sen}(t)\,e^t - \int \cos(t)\,e^t\,dt$

$= \text{sen}(t)\,e^t - (\cos(t)\,e^t - \int e^t(-\text{sen}(t)\,dt))$

$= \text{sen}(t)\,e^t - (\cos(t)\,e^t + \text{sen}(t)\,dt)$

$= \int e^t\,\text{sen}(t)\,dt = \text{sen}(t)\,e^t (\cos(t)\,e^t + \int e^t\,\text{sen}(t)\,dt)$

$= \int e^t\,\text{sen}(t)\,dt = \text{sen}(t)\,e^t - \cos t\,e^t - \int e^t\,\text{sen}(t)\,dt$

$= \int e^t\,\text{sen}(t)\,dt \int e^t\,\text{sen}(t)\,dt = \text{sen}(t)\,e^t - \cos(t)\,e^t$

$= 2\int e^t\,\text{sen}(t)\,dt = \text{sen}(t)\,e^t - \cos(t)\,e^t$

$= \int e^t\,\text{sen}(t)\,dt = \dfrac{\text{sen}(t)\,e^t}{2} - \dfrac{\cos(t)\,e^t}{2}$

$= \dfrac{\text{sen}(\ln(x))\,e^{\ln(x)}}{2} - \dfrac{\cos(\ln(x))\,e^{\ln(x)}}{2}$

$= \dfrac{\text{sen}(\ln(x))\,x}{2} - \dfrac{\cos(\ln(x))\,x}{2}$

$= \dfrac{\text{sen}(\ln(x))\,x - \cos(\ln x)\,x}{2}$

$= \dfrac{\text{sen}(\ln(x))\,x - \cos(\ln(x))\,x}{2} + c$

8. $\int x^2 \ln x \, dx$

$= \ln(x) \, x^2 \, dx$

$= \ln(x) \frac{x3}{3} - \int \frac{x3}{3} - \frac{1}{x} \, dx$

$= \ln(x) \frac{x2}{3} - \int \frac{x2}{3} \, dx$

$= \ln(x) \frac{x3}{3} - \frac{1}{3} \int x^2 \, dx$

$= \ln(x) \frac{x3}{3} - \frac{1}{3} \left(\frac{x3}{3} \right)$

$= \frac{\ln(x) x^3}{3} - \frac{x3}{9}$

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

9. = 8

10. $\int \ln(x^2) \cos(x)\, dx$

$= \ln(x^2) \, \text{sen}(x) - \int \text{sen}(x) \, 2 \frac{1}{x}\, dx$

$= \ln(x^2) \, \text{sen}(x) - 2 \int \text{sen}(x) \frac{1}{x}\, dx$

$= \ln(x^2) \, \text{sen}(x) - 2 \int \frac{\text{sen}(x)}{x}\, dx$

$= \ln(x^2) \, \text{sen}(x)$

$= \ln(x^2) \, \text{sen}(x) + c$