NOMBRE DEL ALUMNO: Mauricio Castillo Ozuna

NOMBRE DEL MAESTRO: Juan José Ojeda Trujillo

NOMBRE DEL TRABAJO: Problemario 3

MATERIA: Matemática Aplicada

GRADO: Sexto Cuatrimestre

GRUPO: Único

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1.- $\int x^2 \operatorname{sen} x \, dx$

$u = x^2$

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

$du = 2x\,dx$

$v = -\cos(x)$

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

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

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

$$x^2 \times (-\cos(x)) + 2 (x \times \operatorname{sen}(x) - \int \operatorname{sen}(x) \, dx)$$

$$-x^2 \times \cos(x) + 2x \times \operatorname{sen}(x) + 2\cos(x) + C$$

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

$u = x^3$

$dv = e^{2x} dx$

$du = 3x^2 dx$

$v = \frac{e^{2x}}{2}$

$x^3 \times \frac{e^{2x}}{2} - \frac{1}{2} \times 3 \times \int e^{2x} x^2 dx$

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

$x^3 \times \frac{e^{2x}}{2} - \frac{3}{2} \times \left(x^2 \times \frac{e^{2x}}{2} - \int e^{2x} \times dx \right)$

$x^3 \times \frac{e^{2x}}{2} - \frac{3}{2} \times \left(x^2 \times \frac{e^{2x}}{2} - \left(x \times \frac{e^{2x}}{2} - \frac{1}{2} \times \int e^{2x} dx \right) \right)$

$x^3 \times \frac{e^{2x}}{2} - \frac{3}{2} \times \left(x^2 \times \frac{e^{2x}}{2} - \left(x \times \frac{e^{2x}}{2} - \frac{1}{2} \times \frac{1}{2} e^{2x} \right) \right)$

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

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3.- $\int x2\sqrt{(1-x)}\,dx$

$2x\int x\sqrt{1-x}\,dx$

$2x\int t\sqrt{t}-\sqrt{t}\,dt$

$2x\int t\,x\,t^{\frac{1}{2}}-t^{\frac{1}{2}}\,dt$

$2x\int t^{\frac{3}{2}}-t^{\frac{1}{2}}\,dt$

$2\left(\int t^{\frac{3}{2}}dt-\int t^{\frac{1}{2}}dt\right)$

$2\left(\frac{2(1-x)^2\,x\sqrt{1-x}}{5}-\frac{2(1-x)\sqrt{1-x}}{3}\right)$

$\frac{4\sqrt{1-x}\,x\left(1-2x+x^2\right)}{5}-\frac{4\sqrt{1-x}\,x\,(1-x)}{3}+C$

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

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

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

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

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

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

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

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

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

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

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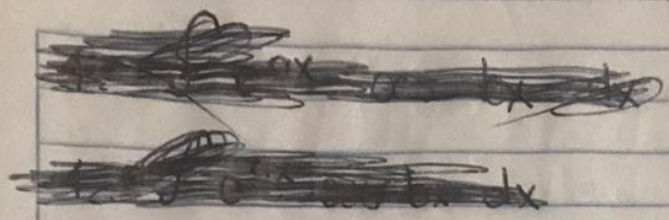

5.- $\int \text{sen}^3 x \, dx$

$\int \sin(x)^2 \sin(x) \, dx$

$\int -1 + t^2 \, dt$

$-\int 1 \, dt + \int t^2 \, dt$

$-t + \frac{t^3}{3}$

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

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

$$\int \frac{1}{2} \times (\sin(5x) + \sin(x)) \, dx$$

$$\frac{1}{2} \times \left(\int \sin(5x) \, dx + \int \sin(x) \, dx \right)$$

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

$$-\frac{\cos(5x)}{10} - \frac{\cos(x)}{2} + C$$

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

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7.- $\int \sin(\ln(x))\,dx$

$\int \sin(t) \times e^t\,dt$

$\sin(t) \times e^t - \int e^t \times \cos(t)\,dt$

$\sin(t) \times e^t - \int \cos(t) \times e^t\,dt$

$\sin(t) \times e^t - (\cos(t) \times e^t - \int e^t \times (-\sin(t))\,dt)$

$\int e^t \times \sin(t)\,dt = \sin(t) \times e^t - \cos(t) \times e^t - \int e^t \times \sin(t)\,dt$

$\int e^t \times \sin(t)\,dt + \int e^t \times \sin(t)\,dt = \sin(t) \times e^t - \cos(t) \times e^t$

$2 \times \int e^t \times \sin(t)\,dt = \sin(t) \times e^t - \cos(t) \times e^t$

$\frac{\sin(\ln(x)) \times e^{\ln(x)}}{2} - \frac{\cos(\ln(x)) \times e^{\ln(x)}}{2}$

$\frac{\sin(\ln(x)) \times x - \cos(\ln(x)) \times x}{2} + C$

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

$\int \ln(x) \times x^2 \, dx$

$u = \ln(x)$

$dv = x^2 \, dx$

$du = \frac{1}{x} dx$

$v = \frac{x^3}{3}$

$\ln(x) \times \frac{x^3}{3} - \int \frac{x^3}{3} \times \frac{1}{x} dx$

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

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

9.- El problema es igual que el 8.

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

$\int \ln x^2 \cos x \, dx$

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

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

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

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