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NOMBRE DEL TRABAJO: Examen III unidad

MATERIA: Matemática Aplicada

GRADO: Sexto Cuatrimestre

GRUPO: Único

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

$$u = x^2$$

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

$$du = 2x \, dx$$

$$v = -\operatorname{Cos}(x)$$

$$x^2 \times (-\operatorname{Cos}(x)) - \int -\operatorname{Cos}(x) \times 2x \, dx$$

$$x^2 \times (-\operatorname{Cos}(x)) - 1x(-2) \times \int \operatorname{Cos}(x) \times x \, dx$$

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

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

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

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$$I = \int x^3 e^{2x} dx$$

$$u = x^3$$

$$dv = e^{2x} dx$$

$$du = 3x^2 dx$$

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

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

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

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

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

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

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

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$$3. \int x^2 \sqrt{1-x} dx$$

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

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

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

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

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

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

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

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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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~~1. $\int \cos x \cos bx dx$~~

~~2. $\int \cos x \sin bx dx$~~

$$5. \int \sin^3 x dx$$

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

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

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

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

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

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$$6: \int \sin 3x \cos 2x \, dx$$

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

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

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

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

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

$$\int \sin(t) x e^t dt$$

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

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

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

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

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

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

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

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

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

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

$$u = \ln(x)$$

$$dv = x^2 \, dx$$

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

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

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

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

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

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$$9. \int x^2 \ln x \, dx$$

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

$$u = \ln(x)$$

$$dv = x^2 \, dx$$

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

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

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

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

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

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

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

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

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

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

$$\underline{\ln(x^2) \sin(x) + C}$$