Victor Ramos

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Lista Semana 13

1a) $\int x e^x \, dx \Rightarrow x \cdot e^x - \int e^x \, dx = \underline{x \cdot e^x - e^x + C}$

$u = x$

$du = 1 \, dx$

b) $\int \ln x \, dx \Rightarrow x \cdot \ln x - \int x \cdot \frac{1}{x} \, dx = \underline{x \cdot \ln x - x + C}$

$u = \ln x \quad dv = 1 \, dx$

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

c) $\int x^3 \ln x \, dx \Rightarrow \ln x \cdot \frac{x^4}{4} - \int \frac{x^4}{4} \cdot \frac{1}{x}$

$u = \ln x \quad dv = x^3$

$du = \frac{1}{x} \, dx \quad v = \frac{x^4}{4}$

$\ln x \cdot \frac{x^4}{4} - \frac{1}{4} \int x^3 \, dx$

$\underline{\ln x \cdot \frac{x^4}{4} - \frac{x^4}{16} + C}$

d) $\int 2x \cos 3x \, dx \Rightarrow 2x \cdot \frac{\operatorname{sen} 3x}{3} - \int \frac{\operatorname{sen} 3x}{3} \cdot 2 \, dx$

$u = 2x \quad dv = \cos 3x$

$du = 2 \, dx \quad v = \frac{\operatorname{sen} 3x}{3}$

$2x \cdot \frac{\operatorname{sen} 3x}{3} - \frac{2}{3} \int \operatorname{sen} 3x \, dx$

$\underline{\frac{2x \cdot \operatorname{sen} 3x}{3} + \frac{2 \cos 3x}{9} + C}$

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

$u = \ln(1+x^2) \quad dv = dx$

$du = \frac{1}{1+x^2} + 2x \, dx \quad v = x$

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

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

$\underline{x \cdot \ln(1+x^2) - 2x + 2 \operatorname{arctg} x + C}$

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f) $\int x \operatorname{arctg} x\, dx \Rightarrow \frac{x^2 \cdot \operatorname{arctg} x}{2} - \int \frac{x^2}{2} \cdot \frac{1}{1+x^2}$

$u = \operatorname{arctg} x \quad dv = x\,dx$

$du = \frac{1}{1+x^2} \quad v = \frac{x^2}{2}$

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

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

$\frac{x^2 \operatorname{arctg} x}{2} - \frac{x}{2} + \frac{\operatorname{arctg} x}{2} + C$

g) $\int x^2 e^x\, dx \Rightarrow x^2 \cdot e^x - \int 2x \cdot e\, dx \Rightarrow x^2 \cdot e^x - 2 \int x \cdot e\, dx$

$u = x^2 \quad dv = e^x dx$

$du = 2x\,dx \quad v = e^x$

$= x^2 \cdot e^x - 2x e^x + 2e^x + C$

h) $\int e^x \cos x\, dx \Rightarrow e^x \cdot \cos x - \int e^x \cdot \operatorname{sen} x$

$u = \cos x \quad dv = e^x dx$

$du = -\operatorname{sen} x\, dx \quad v = e^x$

$v_2 = -\operatorname{sen} x \quad dv_2 = e^x dx$

$dv_2 = -\cos x \quad v_2 = e^x$

$e^x \cdot \cos x - (e^x \cdot \operatorname{sen} x - \int e^x \cdot -\cos x)$

$\frac{e^x \cdot \cos x + e^x \operatorname{sen} x}{2}$