IBE CASSANDRA EZINNE MBBS 19/MHS/185

IBE CASSANDRA EZINNE MBBS 19/MHS01/185

(1) $\int 2x^2 \ln x$

using $\int u\,dv = uv - \int v\,du$

let $u = \ln(x)$ let $dv = 2x^2$

$\frac{du}{dx} = \frac{1}{x}$ $v = \frac{2}{3}x^3$

$du = 1/x \, dx$

$= \ln(x) \cdot \frac{2}{3}x^3 - \int \frac{2}{3}x^3 \cdot 1/x$

$= \frac{2\ln(x)x^3}{3} - \int \frac{2}{3}x^3 \cdot 1/x$

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

$= \frac{2\ln(x)x^3}{3} - \frac{2}{3}\int x^2$

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

$2\ln(x)x^3 - \frac{2}{9}x^3 + C$

$2\left(\frac{\ln(x)x^3 - x^3}{9}\right) + C \Rightarrow \frac{2x^3(\ln(x) - 1)}{9} + C$

IBE CASSANDRA EZINNE MBBS 19/MHS/185

2. $\int 3te^{2t} = 3\int te^{2t}$

let $u = t$ $dV = e^{2t}$

$\frac{du}{dx} = 1$ $V = \frac{1}{2}e^{2t}$

$du = 1\,dx$

$I = \frac{te^{2t}}{2} - \int \frac{1}{2}e^{2t} \cdot 1\,dx$

$= 3\left(\frac{te^{2t}}{2} - \frac{1}{2}\int e^{2t}\,dx\right)$

$= 3\left(\frac{te^{2t}}{2} - \frac{1}{2} \cdot \frac{1}{2}e^{2t} + c\right) + c$

$= 3\left(\frac{te^{2t}}{2} - \frac{1}{4}e^{2t}\right) + c$

IBE CASSANDRA EZINNE MBBS 19/MHS/185

3. $\int x^2 \sin x$

let $u = x^2$ let $\sin x = dv$

$\frac{du}{dx} = 2x$ $dv = \sin x$

$v = -\cos x$

$du = 2x dx$

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

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

using $I_2 = uv - \int v \, du$

$-2\int \cos x \cdot x$

$u = x$ $dv = \cos x$

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

$du = 1 \cdot dx$

$I_2 = -2(x\sin(x) - \int \sin x \, dx)$

$-2(x\sin(x) - \cos(x))$

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

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

IBE CASSANDRA EZINNE MBBS 19/MHS/185

4. $\int \cos 5x \cos 6x$

$X = 5x \quad y = 6x$

$\cos x \cos B = \frac{1}{2}\left(\cos(x+y) + \cos(y-x)\right)$

$\cos 5x \cos 6x = \frac{1}{2}\left(\cos(11x) + \cos(-x)\right)$

$\int \cos 5x \cos 6x = \int \frac{1}{2}\left(\cos 11x + \cos(-x)\right)$

$= \frac{1}{2}\int \cos 11x + \cos(-x)$

$= \frac{1}{2}\left(\int \cos 11x + \int \cos(-x)\right)$

$= \frac{1}{2}\left(\frac{\sin(11x)}{11}\right) + \left(\sin(x)\right)$

$= \frac{\sin(11x)}{22} + \frac{\sin(x)}{2} + C$

IBE CASSANDRA EZINNE MBBS 19/MHS/185

5 $\sin 7x \cos 2x$

$A = 7x \quad B = 2x$

$\sin A \cos B = \frac{1}{2}(\sin(A+B) + \sin(A-B))$

$A+B = 9x \; ; \; A-B = 5x$

$\sin 7x \cos 2x = \frac{1}{2}(\sin 9x + \sin 5x)$

$\underline{I} = \int \frac{1}{2}(\sin 9x + \sin 5x)$

$= \frac{1}{2} \int \sin 9x + \sin 5x$

$= \frac{1}{2}\left(\int \sin 9x + \int \sin 5x\right)$

$= \frac{1}{2}\left(\frac{-1}{9}\cos 9x - \frac{1}{5}\cos 5x\right)$

$= \frac{-1}{18}\cos(9x) - \frac{\cos(5x)}{10}$

$= -\frac{\cos(9x)}{18} - \frac{\cos(5x)}{20} + C$