HARUNA ODUNAYO TOSIN(?) FROM(?) 34 19/AUG/2022

$3te^{2t}$

Let $u = 3t$ & $dv = e^{2t}$

$\frac{du}{dt} = \frac{3}{1}$ $\int dv = \int e^{2t}$

$du = 3dt$ $v = \frac{e^{2t}}{2}$

Using $uv - \int v du = \int u dv$

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

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

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

$\left[\frac{3}{2}te^{2t} - \frac{3e^{2t}}{4}\right] + C$ //

$x^2 \sin x$

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

$\frac{du}{dx} = 2x$ and $v = -\cos x$

Using $uv - \int v du$

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

$-x^2\cos x - \int -2x\cos x dx$

[let $u = -2x$ & $dv = \cos x$ / $du/dx = -2x$ & $v = \sin x$]

$\therefore (-2x)(\sin x) - \int(\sin x)(-2)dx$

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

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

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

$\therefore \int x^2 \sin x = -x^2\cos x - 2x\sin x - 2\cos x + C$ //

$\int \sin 7x \cos 2x$

let $A = 7x$ and $B = 2x$

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

$\frac{1}{2}(\sin(7x+2x) + \sin(7x-2x))$

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

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

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

$\frac{\cos 9x}{18} + \frac{\cos 5x}{10} + C$

$\frac{2x - 3x^2}{1-x}$

$$\begin{array}{r} 2x - x^2 \\ 1-x \,\overline{)\, 2x - 3x^2} \\ -2x - 2x^2 \\ \hline -x^2 \\ -\;-x^2 + x^3 \\ \hline -x^3 \end{array}$$

which can now be

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

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

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