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19/mhs01/428
Medicine & surgery
mab 104

① $2x^2 \ln x$
$= 2x^2 \cdot 1/x$

$u = 2x^2$
$v = \ln x = 1/x(x^{-1}) = -x^{-2}$
$du = 4x$
$dv = -x^{-2}$
$\int u\,dv = uv - \int v\,du$
$= 2x^2 \ln x - \int \ln x\, 4x$

$\int u = \ln x \quad v = 4$
$du = 4 \quad dv = -x^{-2}$
$\hookrightarrow 4x \ln x - \int \ln x\, 4$

$= 2x^2 \ln x - 4x \ln x + 4 \ln x$

2) $3te^{2t}$
$u = 3t \quad du = 3$
$v = e^{2t} \quad dv = 2e^{2t}$

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

$= 3te^{2t} - \int e^{2t}\,3\,dx$

$e^{2t}\,3\,dx$

$u = 3 \quad v = e^{2t}$

$du = 1 \quad dv = 2e^{2t}$

$= \cancel{3e^{2t}}$

$= 3te^{2t} - e^{2t}3$,,

3) $x^2 \sin x$

$u = x^2 \quad v = \sin x$

$du = 2x \quad dv = \cos x$

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

$= x^2 \sin x - \int \sin x\,2x$

$2x$

$\begin{cases} u = \cancel{\sin x} & v = \cancel{2x}\sin x \\ du = \cancel{\cos x}\,2 & dv = 2\cos x \end{cases}$

$= \cancel{\sin x \cdot 2x - 2x\cos x}$

$= 2x\sin x - \sin x \times 2$

$x^2 \sin x - 2x\sin x + 2\sin x$,,

4) $\cos 5x \cos 6x$

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

$$A = 5 \quad B = 6$$

$$= \frac{1}{2\cos}[\cos(5x+6x) + \cos(5x-6x)]$$

$$= \frac{1}{2}[\cos 11x] + \frac{1}{2}[\cos^{2} -x]$$

$$= \frac{1}{22}\cos 11x - \frac{1}{2}\cos -x$$

4) $\sin 7x \cos 2x$

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

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

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

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

$$= \frac{1}{18}\sin 9x + \frac{1}{10}\sin 5x$$

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