Andrew P.
Trevor L
Jeffery N

3. $\int x \cos(x)\, dx$

$u = x \quad v = \frac{1}{5}\sin(5x)$
$du = 1\,dx \quad du = \cos(5x)\,dx$

$\int x\cos(x)\,du = x\,\frac{1}{5}\sin(5x) - \int \frac{1}{5}\sin(5x)\,dx$

$\int x\cos(x)\,du = x\,\frac{1}{5}\sin(5x) + \frac{1}{25}\int \cos(5x)\,dx + C$

7 $\int x^2 \sin \pi x\,dx$

$u = x^2 \quad v = \frac{-1}{\pi}\cos(\pi x)$
$du = 2x \quad dv = \sin(\pi x)$

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

$= x^2 \cdot \frac{1}{\pi}\cos(\pi x) \cdot \frac{2}{\pi}\int \cos(\pi x)\, x\, dx$

$\int \cos(\pi x)\, x\, dx = x \cdot \frac{1}{\pi}\sin(\pi x) - \int \frac{1}{\pi}\sin(\pi x)$

Allison Wren
Kristen Hoeb...

Pg. 480 ~~3~~, ~~7~~, ~~13~~, ~~21~~, 23, 33

3) $\int x\cos 5x\,dx$

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

$u = x$ $\qquad v = \frac{1}{5}\sin 5x$

$du = 1\,dx$ $\qquad dv = \cos 5x\,dx$

$= (x)(\frac{1}{5}\sin 5x) - \int \frac{1}{5}\sin 5x\, 1\,dx$

$= (x)(\frac{1}{5}\sin 5x) - \frac{1}{5}(-\frac{1}{5}\cos 5x) + C$

$= (x)(\frac{1}{5}\sin 5x) + \frac{1}{25}\cos 5x + C$

7) $\int x^2 \sin \pi x\,dx$

$u = x^2$ $\qquad v = -\frac{1}{\pi}\cos \pi x$

$du = 2x\,dx$ $\qquad dv = \sin \pi x\,dx$

$= (x^2)(-\frac{1}{\pi}\cos \pi x) - \int (-\frac{1}{\pi}\cos \pi x)(2x)$

$= \frac{-x^2}{\pi}\cos \pi x + \frac{1}{\pi}\int \cos \pi x\, 2x\,dx$

$u = 2x$ $\qquad v = \frac{1}{\pi}\sin \pi x$

$du = 2\,dx$ $\qquad dv = \cos \pi x$

$= (2x)(\frac{1}{\pi}\sin \pi x) - \int (\frac{1}{\pi}\sin \pi x)(2\,dx)$

$= \frac{2x}{\pi}\sin \pi x - \frac{2}{\pi}(-\frac{1}{\pi}\cos \pi x) + C$

$= \frac{2x}{\pi}\sin \pi x + \frac{2}{\pi^2}\cos \pi x + C$

$= -\frac{x^2}{\pi}\cos \pi x + \frac{2x}{\pi^2}\sin \pi x + \frac{2}{\pi^3}\cos \pi x + C$

13.) $\int (\ln x)^2 dx =$ $\quad\quad$ $\int u\,dv = uv - \int v\,du$

$u = (\ln x)^2 \quad v = x$

$du = \frac{2\ln x}{x} dx \quad dv = 1dx$

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

$= x(\ln x)^2 - \int 2\ln x$

$= x(\ln x)^2 - 2x\ln x + 2x + C$

21.) $\int_1^2 \frac{\ln x}{x^2} dx$

$u = \ln x \quad\quad v = -\frac{1}{x}$

$du = \frac{1}{x} \quad\quad dv = \frac{1}{x^2} \quad x^{-2}$

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

$= (\ln x)\left(-\frac{1}{x}\right) - \int \left(\frac{-1}{x}\right)\left(\frac{1}{x}\right)$

$= \frac{-\ln x}{x} - \int -\frac{1}{x^2}$

$= \frac{-\ln x}{x} - \frac{1}{x}$

$= \left(\frac{-\ln 2}{2} - \frac{1}{2}\right) - \left(\frac{-\ln 1}{1} - 1\right)$

$= \frac{-\ln 2}{2} - \frac{1}{2} + 1$

$= -\frac{\ln 2}{2} + \frac{1}{2}$

$= \frac{1}{2} - \frac{\ln 2}{2}$

Justin Ashley
Andy Chleborad
Tanner Burt

Jan 22 Group Work

3.) $\int x\cos 5x\,dx$ $\qquad uv - \int v\,du$

$u - x \quad v - \frac{1}{5}\sin(5x)$
$du - 1 \quad dv - \cos(5x)\,dx$

$$= \frac{1}{5}x\sin(5x) - \int \frac{1}{5}\sin(5x)\,dx$$
$$= \frac{1}{5}x\sin(5x) + \frac{1}{25}\cos(5x) + C$$

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

$\int \ln x \ \ln x\,dx$

$u - \ln x \quad v - x\ln x - x$
$du - \frac{1}{x} \quad dv - \ln x$

$$= \ln x\cdot(x\ln x - x) - \int \ln x - 1\,dx$$
$$= x(\ln x)^2 - x\ln x - \int \ln x - 1\,dx$$
$$- \int \ln x\,dx - \int dx$$
$$-(x\ln x - x) - x)$$
$$= x(\ln x)^2 - x\ln x - x\ln x + 2x$$
$$= x(\ln x)^2 - 2x\ln x + 2x + C$$

23) $\int_0^1 \frac{y}{e^{2y}}\,dy = \int_0^1 y e^{-2y} -$ $\qquad u = y \quad v = -\frac{1}{2}e^{-2y}$
$du = 1\,dy \quad dv = e^{-2y}\,dy$

$$= -\frac{1}{2}ye^{-2y} + \frac{1}{2}\int e^{-2y}\,dy$$
$$= -\frac{1}{2}ye^{-2y} - \frac{1}{4}e^{-2y}\Big|_0^1$$
$$= \left(-\frac{1}{2}e^{-2} - \frac{1}{4}e^{-2}\right) - \left(0 - \frac{1}{4}\right) = \frac{1}{4} - \frac{3}{4}e^{-2}$$

Will Reimer
Integration by Parts
Pg 480, #3,7,13,21,23,…
Adam Braegelman
Thomas Schuler

3. $\int x\cos 5x\,dx$ $\quad u = x \quad dv = \cos 5x\,dx$

$= \frac{1}{5}x\sin 5x - \int \frac{1}{5}\sin 5x\,dx \quad du = 1dx \quad v = \frac{1}{5}\sin 5x$

$= \frac{1}{5}x\sin 5x - \frac{1}{5}\int \sin 5x\,dx$

$= \frac{1}{5}x\sin 5x - \frac{1}{5}\left(\frac{-1}{5}\cos 5x\right) + C$

$= \boxed{\frac{1}{5}x\sin 5x + \frac{1}{25}\cos 5x + C}$

7. $\int x^2 \sin \pi x\,dx$ $\quad u = x^2 \quad dv = \sin \pi x\,dx$

$du = 2x\,dx \quad v = \frac{-1}{\pi}\cos \pi x$

$= \frac{-x^2}{\pi}\cos \pi x - \int \frac{-2x}{\pi}\cos \pi x\,dx$

$= \frac{-x^2}{\pi}\cos \pi x + \frac{2}{\pi}\int x\cos \pi x\,dx \quad u = x \quad dv = \cos \pi x\,dx$

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

$= \frac{-x^2}{\pi}\cos \pi x + \frac{2}{\pi}\left(\frac{x}{\pi}\sin \pi x - \int \frac{1}{\pi}\sin \pi x\,dx\right)$

$= \frac{-x^2}{\pi}\cos \pi x + \frac{2x}{\pi^2}\sin \pi x - \frac{2}{\pi^2}\int \sin \pi x\,dx$

$= \boxed{\frac{-x^2}{\pi}\cos \pi x + \frac{2x}{\pi^2}\sin \pi x + \frac{2}{\pi^3}\cos \pi x + C}$

13. $\int (\ln x)^2 dx$

$= \int \ln x(\ln x)dx \quad u = \ln x \quad dv = \ln x\,dx$

$= \ln x(x\ln x - x) - \int(\ln x - 1)dx \quad du = \frac{1}{x}dx \quad v = x\ln x - x$

$= \ln x(x\ln x - x) - (x\ln x - x - x) + C$

$= x(\ln x)^2 - x\ln x - x\ln x + 2x + C$

$= \boxed{x(\ln x)^2 - 2x\ln x + 2x + C}$

21. $\int_1^2 \frac{\ln x}{x^2}dx$ $\quad u = \ln x \quad dv = x^{-2}dx$

$= \frac{-1}{x}\ln x - \int_1^2 \frac{-1}{x^2}dx \quad du = \frac{1}{x}dx \quad v = \frac{-1}{x}$

$= \frac{-1}{x}\ln x + \int \frac{1}{x^2}dx$

$= \frac{-1}{x}\ln x - \frac{1}{x}\Big|_1^2$

$= \frac{-1}{2}\ln 2 - \frac{1}{2} - (-\ln 1 - 1)$

$= \boxed{\frac{-1}{2}\ln 2 + \frac{1}{2}}$