8.1 4-12 even, 34.

4. $\int xe^{-x}\,dx$

$u = x \quad dv = e^{-x}dx$

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

$\int xe^{-x}dx = x(-e^{-x}) - \int -e^{-x}dx$

$= -xe^{-x} + \int e^{-x}dx$

$= -xe^{-x} - e^{-x} + C.$

---

6. $\int t\sin(2t)\,dt$

$u = t \quad dv = \sin(2t)dt$

$du = dt \quad v = -\frac{1}{2}\cos(2t)$

$\int t\sin(2t)dt = t(-\frac{1}{2}\cos(2t)) - \int -\frac{1}{2}\cos(2t)dt$

$= -\frac{t}{2}\cos(2t) - \frac{1}{4}\sin(2t) + C$

---

8. $\int x^2\cos(mx)\,dx$

$u = x^2 \quad dv = \cos(mx)dx$

$du = 2x\,dx \quad v = \frac{1}{m}\sin(mx)$

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

$= \frac{x^2}{m}\sin(mx) - \frac{2}{m}\int x\sin(mx)\,dx$

$u = x \quad dv = \sin(mx)dx$

$du = dx \quad v = -\frac{1}{m}\cos(mx)$

$= \frac{x^2}{m}\sin(mx) - \frac{2}{m}(-\frac{x}{m}\cos(mx) - \int -\frac{1}{m}\cos(mx)dx)$

$= \frac{x^2}{m}\sin(mx) + \frac{2x}{m^2}\cos(mx) - \frac{2}{m^3}\sin(mx).$

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10. $\int \sin^{-1}x\,dx \quad u = \sin^{-1}x \quad dv = dx$

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

$= (\sin^{-1}x)x - \int \frac{x}{\sqrt{1+x^2}}dx \quad \{u = 1+x^2,\ du = 2x\,dx$

$= x\sin^{-1}x - \frac{1}{2}\int \frac{1}{u^{1/2}}du$

$= x\sin^{-1}x - u^{1/2} + C$

$= x\sin^{-1}x - (\sin^{-1}x)^{1/2} + C.$

---

12. $\int p^5 \ln p\,dp \quad u = \ln p \quad dv = p^5dp$

$du = \frac{1}{p}dp \quad v = \frac{p^6}{6}$

$(\ln p)\frac{p^6}{6} - \int \frac{p^6}{6}\cdot\frac{1}{p}dp$

$= \frac{p^6}{6}\ln p - \frac{1}{6}\int p^5 dp$

$= \frac{p^6}{6}\ln p - \frac{1}{36}p^6 + C.$

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34. $\int t^3e^{-t^2}dt. \quad u = t^2$

$= \int t^2e^{-t^2}(tdt) \quad du = 2tdt$

$= \int ue^{-u}(\frac{1}{2}du) \quad r = u \quad ds = e^{-u}du$

$dr = du \quad s = -e^{-u}$

$= \frac{1}{2}(rs - \int s\,dr)$

$= \frac{1}{2}(-ue^{-u} + \int +e^{-u}du) = -\frac{1}{2}ue^{-u} - e^{-u} + C$

$= -\frac{1}{2}t^2e^{-t^2} - e^{-t^2} + C.$