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

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

$du = \cos x dx \quad dv = e^{2x}dx$

$-\frac{1}{2}\int e^{2x}\cos x dx = -\frac{1}{2}\left\{\frac{1}{2}e^{2x}\cos x + \frac{1}{2}\int e^{2x}\sin x dx\right\} = -\frac{1}{4}e^{2x}\cos x - \frac{1}{4}\int e^{2x}\sin x dx$

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

$du = -\sin x dx \qquad dv = e^{2x}dx$

$\therefore \int e^{2x}\sin x dx = \frac{1}{2}e^{2x}\sin x - \frac{1}{4}e^{2x}\cos x - \frac{1}{4}\int e^{2x}\sin x dx$

$\Leftrightarrow \int e^{2x}\sin x dx + \frac{1}{4}\int e^{2x}\sin x dx = \frac{1}{2}e^{2x}\sin x - \frac{1}{4}e^{2x}\cos x$

$\Leftrightarrow \left(1+\frac{1}{4}\right)\int e^{2x}\sin x dx = \frac{5}{4}\int e^{2x}\sin x dx = \frac{1}{2}e^{2x}\sin x - \frac{1}{4}e^{2x}\cos x$

$\Leftrightarrow \int e^{2x}\sin x dx = \frac{4}{5}\left(\frac{1}{2}e^{2x}\sin x - \frac{1}{4}e^{2x}\cos x\right) = \frac{2}{5}e^{x}\sin x - \frac{1}{5}e^{2x}\cos x + C$

(31) $y' = xe^{x^2} \Leftrightarrow \frac{dy}{dx} = xe^{x^2} \Leftrightarrow dy = xe^{x^2}dx \Leftrightarrow \int dy = \int xe^{x^2}dx \Leftrightarrow y = \int xe^{x^2}dx$

$y = \int xe^{x^2}dx$

$u = x^2 \Rightarrow du = 2x$

$\therefore \int xe^{x^2}dx = \frac{1}{2}\int e^{u}du = \frac{1}{2}e^{x^2} + C = y$

(33) $\frac{dy}{dt} = \frac{t^2}{\sqrt{2+3t}} \Leftrightarrow \int dy = \int \frac{t^2}{\sqrt{2+3t}}dt \Leftrightarrow y = \int \frac{t^2}{\sqrt{2+3t}}dt$

$u = t^2 \qquad v = \frac{1}{3}(2+3t)^{(1/2)}$

$du = 2tdt \qquad dv = \frac{1}{(2+3t)^{(1/2)}}$

$\int \frac{t^2}{\sqrt{2+3t}}dt = \frac{1}{3}t^2(2+3t)^{(1/2)} - \frac{2}{3}\int t(2+3t)^{(1/2)}dt$

$u = t \qquad v = -\frac{4}{9}(2+3t)^{(3/2)}$

$du = dt \qquad dv = -\frac{2}{3}(2+3t)^{(1/2)}dt$