Indefinite Integrals Ex 19.27 Q10

Let $I = \int e^{2x} \cos^2 x dx$

$$= \frac{1}{2}\int e^{2x} 2 \cos^2 x dx$$
$$= \frac{1}{2}\int e^{2x} \left(1 + \cos 2x\right) dx$$
$$= \frac{1}{2}\int e^{2x} dx + \frac{1}{2}\int e^{2x} \cos 2x dx$$

$\because \quad \int e^{ax} \cos bx dx = \frac{e^{ax}}{a^2 + b^2}\left\{a \cos bx - b \sin bx\right\} + c$

$\therefore \quad I = \frac{1}{4} e^{2x} + \frac{1}{2} \frac{e^{2x}}{8}\left\{2 \cos 2x + 2 \sin 2x\right\} + c$

Hence,

$$I = \frac{e^{2x}}{4} + \frac{e^{2x}}{16}\left\{2 \cos 2x + 2 \sin 2x\right\} + c$$

or

$$I = \frac{e^{2x}}{4} + \frac{e^{2x}}{8}\left\{\cos 2x + \sin 2x\right\} + c$$

Indefinite Integrals Ex 19.27 Q11

Let $I = \int e^{-2x} \sin x dx$

$\because \quad \int e^{ax} \sin bx = \frac{e^{ax}}{a^2 + b^2}\left\{a \sin bx - b \cos bx\right\} + c$

$\therefore \quad I = \frac{e^{-2x}}{5}\left\{-2 \sin x - \cos x\right\} + c$

Indefinite Integrals Ex 19.27 Q12

Let $I = \int x^2 e^{x^3} \cos x^3 dx$

Let $x^3 = t$

$\Rightarrow \qquad 3x^2 dx = dt$

$\therefore \qquad I = \frac{1}{3}\int e^t \cos t dt$

$\because \qquad \int e^{ax} \cos bx dx = \frac{e^{ax}}{a^2+b^2}\left\{a\cos bx + b\sin bx\right\} + c$

$\therefore \qquad I = \frac{1}{3}\left\{\frac{e^t}{2}\left(\cos t + \sin t\right)\right\} + c$

$\therefore \qquad I = \frac{1}{3}\left\{\frac{e^{x^3}}{2}\left(\cos x^3 + \sin x^3\right)\right\} + c$

*********** END **********