Indefinite Integrals Ex 19.26 Q18

$$\text{Let } I = \int e^x \left(\sin^{-1} x + \frac{1}{\sqrt{1-x^2}}\right) dx$$

$$I = \int e^x \sin^{-1} x + \int e^x \frac{1}{\sqrt{1-x^2}} dx$$

Integrating by parts

$$= e^x \sin^{-1} x - \int e^x \left(\frac{d}{dx}\left(\sin^{-1} x\right)\right) dx + \int e^x \frac{1}{\sqrt{1-x^2}} dx$$

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

$$= e^x \sin^{-1} x + c$$

Indefinite Integrals Ex 19.26 Q19

$$\text{Let } I = \int e^{2x} \left(-\sin x + 2\cos x\right) dx$$

$$= -\int e^{2x} \sin x dx + 2\int e^{2x} \cos x dx$$

Applying by parts in the 2^{nd} integrand

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

$$= -\int e^{2x} \sin x dx + e^{2x} \cos x + \int e^{2x} \sin x dx + c$$

$$= e^{2x} \cos x + c$$

Thus,

$$I = e^{2x} \cos x + c$$

Indefinite Integrals Ex 19.26 Q20

Let $I = \int e^x \left(\tan^{-1} x + \frac{1}{1+x^2}\right) dx$

Here, $f(x) = \tan^{-1} x$ and $f'(x) = \frac{1}{1+x^2}$

And we know that,

$\int e^{ax} \left(af(x) + f'(x)\right) dx = e^{ax} f(x) + c$

$\therefore \quad \int e^x \left(\tan^{-1} x + \frac{1}{1+x^2}\right) dx = e^x \tan^{-1} x + c$

Thus,

$I = e^x \tan^{-1} x + c$

Indefinite Integrals Ex 19.26 Q21

Let $I = \int e^x \left(\frac{\sin x \cos x - 1}{\sin^2 x}\right) dx$

$= \int e^x \left(\cot x - \operatorname{cosec}^2 x\right) dx$

$= \int e^x \left(\cot x + \left(-\operatorname{cosec}^2 x\right)\right) dx$

$\because \quad \int e^{ax} \left(af(x) + f'(x)\right) dx = e^{ax} f(x) + c$

Here $f(x) = \cot x$

$\Rightarrow \quad f'(x) = -\operatorname{cosec}^2 x$

$\therefore \quad \int e^x \left(\cot x - \operatorname{cosec}^2 x\right) dx = e^x \cot x + c$

Thus,

$I = e^x \cot x + c$

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