

Integrate the following \Rightarrow

(1) $\int \sin^{-1}(\cos x) dx$

$$\int \sin^{-1} \left[\sin \left(\frac{\pi}{2} - x \right) \right] dx$$

$$\int \left(\frac{\pi}{2} - x \right) dx$$

$$\frac{\pi}{2} \int dx - \int x dx \Rightarrow \frac{\pi}{2} x - \frac{x^2}{2} + C$$

(2) $\int \frac{\cos 2x}{(\cos x + \sin x)^2} dx$

$$\int \frac{\cos^2 x - \sin^2 x}{(\cos x + \sin x)^2} dx$$

$$\int \frac{(\cancel{\cos x + \sin x})(\cos x - \sin x)}{(\cos x + \sin x)^2} dx$$

$$\int \frac{\cos x - \sin x}{\cos x + \sin x} dx = \int \frac{dt}{t}$$

Let $\cos x + \sin x = t$
 $dt = (\cos x - \sin x) dx \quad \therefore \frac{dt}{dx} = \cos x - \sin x$

$$\Rightarrow \log t + C \Rightarrow \log(\cos x + \sin x) + C.$$

$$(3) \int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$$

let $xe^x = t$
differentiating w.r.t x

$$xe^x + e^x = \frac{dt}{dx}$$

$$(x+1)e^x = \frac{dt}{dx}$$

$$dt = e^x(1+x)dx$$

$$\int \frac{dt}{\cos^2 t} = \int \sec^2 t dt$$

$$\Rightarrow \tan t + C \Rightarrow \boxed{\tan(xe^x) + C}$$

Solve Ex- 7.3