

$$1a) \int \cos x \, dx$$

$$= \underline{\underline{\sin x + C}}$$

$$b) \int \operatorname{cosec} 3x \cot 3x \, dx$$

$$= \underline{\underline{-\frac{1}{3} \operatorname{cosec} 3x + C}}$$

$$c) \int 2 \sec^2 4x \, dx$$

$$= \underline{\underline{\frac{1}{2} \tan 4x + C}}$$

$$2a) \quad 1 + \tan^2 \theta = \sec^2 \theta$$

$$\tan^2 \theta = \sec^2 \theta - 1$$

$$b) \int \sec^2 \theta - 1 \, d\theta$$

$$\underline{\underline{\tan \theta - \theta + C}}$$

$$3a) \int \frac{\sin x}{\cos^2 x} \, dx$$

$$\int \frac{\sin x}{\cos x} \cdot \frac{1}{\cos x} \, dx$$

$$\int \sec x \tan x \, dx$$

$$= \underline{\underline{\sec x + C}}$$

$$b) \int 2 \operatorname{cosec}^2 x + \sin x \, dx$$

$$\underline{\underline{-2 \cot x - \cos x + C}}$$

$$4a) \int \sec^2(3x+1) dx$$

$$\underline{\underline{\frac{1}{3} \tan(3x+1) + C}}$$

$$b) \int (\sec x + \tan x)^2 dx$$

$$\int \sec^2 x + 2 \sec x \tan x + \tan^2 x dx$$

$$\int \sec^2 x + 2 \sec x \tan x + \sec^2 x - 1 dx$$

$$\int 2 \sec^2 x + 2 \sec x \tan x - 1 dx$$

$$\underline{\underline{2 \tan x + 2 \sec x - x + C}}$$

$$5) \frac{1}{2} \sin 4x = \sin 2x \cos 2x$$

$$\int_0^{\frac{\pi}{4}} \frac{1}{2} \sin 4x dx$$

$$\left[ -\frac{1}{8} \cos 4x \right]_0^{\frac{\pi}{4}}$$

$$\left[ -\frac{1}{8} \cos\left(\frac{4\pi}{4}\right) \right] - \left[ -\frac{1}{8} \cos(0) \right]$$

$$= \underline{\underline{\frac{1}{4}}}$$

6a)

$$\cos 2x = 1 - 2 \sin^2 x$$

$$2 \sin^2 x = 1 - \cos 2x$$

$$\sin^2 x = \frac{1}{2} - \frac{1}{2} \cos 2x$$

b)

$$\int \frac{1}{2} - \frac{1}{2} \cos 2x \, dx$$

$$\underline{\underline{\frac{1}{2}x - \frac{1}{4} \sin 2x + c}}$$

7.6a)

$$\cos 2x = 2 \cos^2 x - 1$$

$$\cos 2x + 1 = 2 \cos^2 x$$

$$\frac{1}{2} \cos 2x + \frac{1}{2} = \cos^2 x$$

$$\int_0^{\frac{\pi}{2}} \left( \frac{1}{2} \cos 2x + \frac{1}{2} \right) dx$$

$$\left[ \frac{1}{4} \sin 2x + \frac{1}{2} x \right]_0^{\frac{\pi}{2}}$$

$$\left[ \frac{1}{4} \sin \pi + \frac{\pi}{4} \right] - \left[ \frac{1}{4} \sin 0 + \frac{1}{2} (0) \right]$$

$$\underline{\underline{\frac{\pi}{4}}}$$