

**76.**  $\int \sin^7(2x) \cos(2x) dx$

$$\begin{aligned} \text{Let } u &= \sin(2x) \quad \frac{du}{2} = \cos(2x) dx \\ \Rightarrow \frac{1}{2} \int u^7 du &= \frac{1}{2} \left( \frac{u^8}{8} \right) + C = \boxed{\frac{\sin^8(2x)}{16} + C} \end{aligned}$$

**86.**  $\int \sqrt{\sin x} \cos^3 x dx$

$$\begin{aligned} \int \sqrt{\sin x} (1 - \sin^2 x) \cos x dx &= \int (\sqrt{\sin x} - \sin^{5/2}) \cos x dx \\ \text{Let } u &= \sin x \quad du = \cos x dx \\ \Rightarrow \int (\sqrt{u} - u^{5/2}) du &= \frac{2u^{3/2}}{3} - \frac{2u^{7/2}}{7} + C = \boxed{\frac{2(\sin x)^{3/2}}{3} - \frac{2(\sin x)^{7/2}}{7} + C} \end{aligned}$$

**134.**  $\int \frac{dx}{\sqrt{4-x^2}}$

$$\begin{aligned} \text{Using } a^2 - u^2 \Rightarrow u &= a \sin \theta; \quad x = 2 \sin \theta \quad dx = 2 \cos \theta d\theta \\ \Rightarrow \int \frac{2 \cos \theta d\theta}{\sqrt{4 - 4 \sin^2 \theta}} &= \int \frac{2 \cos \theta d\theta}{\sqrt{4(1 - \sin^2 \theta)}} = \int \frac{\cos \theta d\theta}{\sqrt{1 - \sin^2 \theta}} = \int \frac{\cos \theta d\theta}{\sqrt{\cos^2 \theta}} = \int \frac{\cos \theta d\theta}{\cos \theta} = \int d\theta \\ &= \theta + C = \boxed{\sin^{-1} \left( \frac{x}{2} \right) + C} \end{aligned}$$

**138.**  $\int \frac{x^2 dx}{\sqrt{1-x^2}}$

$$\begin{aligned} \text{Using } a^2 - u^2 \Rightarrow u &= a \sin \theta; \quad x = \sin \theta \quad dx = \cos \theta d\theta \\ \int \frac{\sin^2 \theta \cos \theta d\theta}{\sqrt{1 - \sin^2 \theta}} &= \int \frac{\sin^2 \theta \cos \theta d\theta}{\sqrt{\cos^2 \theta}} = \int \frac{\sin^2 \theta \cos \theta d\theta}{\cos \theta} = \int \sin^2 \theta d\theta \Rightarrow \int \frac{1 - \cos 2\theta}{2} d\theta \\ &= \frac{2\theta - \sin 2\theta}{4} + C = \boxed{\frac{2 \sin^{-1}(x) - \sin(2 \sin^{-1}(x))}{4} + C} \end{aligned}$$

**146.**  $\frac{dx}{(1+x^2)^{3/2}}$

$$\begin{aligned} \text{Using } a^2 + u^2 \Rightarrow u &= a \tan \theta; \quad x = \tan \theta \quad dx = \sec^2 \theta d\theta \\ \int \frac{\sec^2 \theta d\theta}{(1 + \tan^2 \theta)^{3/2}} &= \int \frac{\sec^2 \theta d\theta}{(\sec^2 \theta)^{3/2}} = \int \frac{\sec^2 \theta d\theta}{\sec^3 \theta} = \int \sec^{-1} \theta d\theta = \int \cos \theta d\theta \\ &= \sin \theta + C = \boxed{\sin(\tan^{-1}(x)) + C} \end{aligned}$$