

$$\int \frac{x+3}{\sqrt{9-x^2}} dx$$

$$\int \frac{f'(x)}{\sqrt{1-(f(x))^2}} dx = \arcsin(f(x)) + C$$

$$I = \int \frac{x+3}{\sqrt{9-x^2}} dx = \underbrace{\int \frac{x}{\sqrt{9-x^2}} dx}_{I_1} + \underbrace{\int \frac{3}{\sqrt{9-x^2}} dx}_{I_2}$$

$$I_2 = \int \frac{3}{\sqrt{9-x^2}} dx = \int \frac{3}{\sqrt{9(1-\frac{x^2}{9})}} dx =$$

$$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$$

$$= \int \frac{3}{3 \cdot \sqrt{1-(\frac{x}{3})^2}} dx = 3 \int \frac{1/3}{\sqrt{1-(\frac{x}{3})^2}} dx = 3 \arcsin\left(\frac{x}{3}\right)$$

$$I_1 = \int \frac{x}{\sqrt{9-x^2}} dx = \int x \cdot (9-x^2)^{-1/2} dx =$$

$$\frac{d}{dx} (9-x^2) = -2x$$

$$\int f'(x) f(x)^n dx = \frac{f(x)^{n+1}}{n+1} + C \quad n \neq -1$$

$$= -\frac{1}{2} \int -2x (9-x^2)^{-1/2} dx = -\frac{1}{2} \frac{(9-x^2)^{1/2}}{1/2}$$

$$I = -(9-x^2)^{1/2} + \arcsin\left(\frac{x}{3}\right) + C$$