

Q1: Evaluate $\int \frac{dx}{\sqrt{7-6x-x^2}}$

$$= \int \frac{dx}{\sqrt{16-(x+3)^2}}$$

$$= \sin^{-1} \left(\frac{x+3}{4} \right) + C$$

Q2: Evaluate $\int \frac{\sec^2 x \, dx}{\sqrt{\tan^2 x + 4}}$

$$7 - \underbrace{6x} - \underbrace{x^2} + \underbrace{9} - \underbrace{9} \\ 16 - (x+3)^2$$

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

$$\text{let } \tan x = t$$

$$\sec^2 x \, dx = dt$$

$$\int \frac{dt}{\sqrt{t^2 + 4}} = \log |t + \sqrt{t^2 + 4}| + C$$

$$= \log |\tan x + \sqrt{\tan^2 x + 4}| + C$$

Q3 : Evaluate $\int \frac{1}{\sqrt{(2-x)^2 + 1}} \, dx$

$$\text{Let } 2-x = t \quad ; \quad -dx = dt$$

$$I = \int \frac{dt}{\sqrt{t^2+1}} = -\log |t + \sqrt{t^2+1}| + C$$

$$= -\log |(2-x) + \sqrt{(2-x)^2+1}| + C$$

$$= \log \left| \frac{1}{(2-x) + \sqrt{(2-x)^2+1}} \right| + C$$

Q4: Evaluate: $\int \frac{dx}{\sqrt{(x-1)(x-2)}}$