

11/11/2018

Assignment

$$1) \int \frac{2x}{\sqrt{4x^2-1}} dx = \frac{1}{2} \int \frac{1}{\sqrt{4x^2-1}} dx$$

$$= 2 \int \frac{x}{(4x^2-1)^{1/2}} dx$$

$$u = (4x^2-1)^{1/2}$$

$$u^2 = 4x^2-1$$

$$u^2 + 1 = 4x^2$$

$$x = \frac{\sqrt{u^2+1}}{2} \quad \therefore x = \left( \frac{u^2+1}{4} \right)^{1/2}$$

$$\frac{dx}{du} = \frac{1}{2} \left( \frac{u^2+1}{4} \right)^{-1/2} \cdot u$$

$$dx = \frac{u du}{4} \left( \frac{u^2+1}{4} \right)^{-1/2}$$

$$2 \int \left( \frac{u^2+1}{4} \right)^{1/2} \cdot \frac{1}{u} \cdot \frac{u du}{4} \left( \frac{u^2+1}{4} \right)^{-1/2}$$

$$\frac{2}{4} \int \frac{u}{u} du = \frac{2}{4} \int du = \frac{1}{2} (u) + c$$

$$\int \frac{2x}{(4x^2-1)^{1/2}} dx = \frac{\sqrt{4x^2-1}}{2} + c = \frac{1}{2} \sqrt{4x^2-1} + c$$

$$2) \int \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$$

$$\int \sin^{-1} x \cdot (\sqrt{1-x^2})^{-1} dx$$

$$u = \sin^{-1} x$$

$$\frac{du}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$du = dx$$

$$\sqrt{1-x^2}$$

$$du = (\sqrt{1-x^2})^{-1} dx$$

$$\int u du$$

$$\frac{u^2}{2} + C$$

$$2$$

$$= \frac{(\sin^{-1} x)^2}{2} + C$$

$$2$$

$$3). \int (\tan x)^6 \sec^2 x dx$$

$$u = \tan x$$

$$\frac{du}{dx} = \sec^2 x$$

$$dx$$

$$du = \sec^2 x dx$$

$$\int u^6 du$$

$$\left( \frac{u^7}{7} \right) + C$$

$$\frac{(\tan x)^7}{7} + C$$

$$7$$