Diffrentiation = अवकलन

06. Quotient rule

$$\frac{\mathbf{d}}{\mathbf{dx}}\left(\frac{u}{v}\right) = \frac{\mathbf{v}\frac{\mathbf{d}}{\mathbf{dx}}\mathbf{u} - \mathbf{u}\frac{\mathbf{d}}{\mathbf{dx}}v}{\mathbf{v^2}}$$

$$\mathbf{y} = \frac{\mathbf{x^2 - 1}}{\mathbf{x^2 + 1}}$$

$$\frac{\mathbf{d}}{\mathbf{dx}}\left(\frac{\mathbf{x^2 - 1}}{\mathbf{x^2 + 1}}\right) = \frac{(\mathbf{x^2 + 1})\frac{d}{dx}(x^2 - 1) - (x^2 - 1)\ \frac{d}{dx}(x^2 + 1)}{(\mathbf{x^2 + 1})^2}$$

$$= \frac{(x^2 + 1)\left[\frac{d}{dx}(x^2) - \frac{d}{dx}(1)\right] - (x^2 - 1)\left[\frac{d}{dx}(x^2) + \frac{d}{dx}(1)\right]}{(x^2 + 1)^2}$$

$$= \frac{(x^2 + 1)[2x^{2-1} - 0] - (x^2 - 1)[2x^{2-1} + 0]}{(x^2 + 1)^2}$$

$$= \frac{(x^2 + 1)[2x - 0] - (x^2 - 1)[2x + 0]}{(x^2 + 1)^2}$$

$$\frac{(x^2 + 1)[2x] - (x^2 - 1)[2x]}{(x^2 + 1)^2}$$

$$\frac{4x}{(x^2 + 1)^2}\ Ans$$

$$\mathbf{y} = \frac{2x}{4x+3}$$

$$\frac{\mathbf{d}}{\mathbf{dx}}\left(\frac{2x}{4x+3}\right) = \frac{(4x+3)\frac{d}{dx}(2x) - (2x)\frac{d}{dx}(4x+3)}{(4x+3)^2}$$

$$= \frac{(4x+3)2\frac{d}{dx}(x) - (2x)\left[\frac{d}{dx}(4x) + \frac{d}{dx}(3)\right]}{(4x+3)^2}$$

$$= \frac{2(4x+3) - 2x[4(1)+(0)]}{(4x+3)^2}$$

$$= \frac{8x+6-8x}{(4x+3)^2} = \frac{6}{(4x+3)^2}\ \boldsymbol{Ans}$$