$$y = v e^{a \sin^{-1} x}$$

where v is function of x

$$y = v e^{a \sin^{-1} x}$$

$$\frac{dy}{dx} = \frac{d}{dx}\left(\underset{\mathrm{I}}{v}\ \underset{\mathrm{II}}{e}^{a \sin^{-1} x}\right)$$

$$= \cancel{\frac{dv}{}}$$

using chain rule $d(\underset{\mathrm{I}}{u} \cdot \underset{\mathrm{II}}{v}) = u \cdot dv + v \cdot du$

$$= v \cdot \frac{d}{dx}\left(e^{a \sin^{-1} x}\right) + e^{a \sin^{-1} x} \cdot \frac{dv}{dx}$$

$$\frac{dy}{dx} = v \cdot a e^{a \sin^{-1} x} \cdot \frac{d}{dx}(\sin^{-1} x) + e^{a \sin^{-1} x} \cdot \frac{dv}{dx}$$

$$\because \frac{d}{dx}(e^{ax}) = e^{ax} \cdot \frac{d(ax)}{dx} = a e^{ax}$$

$$\frac{d}{dx}(\sin^{-1}x) = \frac{1}{\sqrt{1-x^2}}$$

So $$\frac{dy}{dx} = a e^{a\sin^{-1}x} \cdot \frac{1}{\sqrt{1-x^2}} + e^{a\sin^{-1}x} \frac{dv}{dx}$$

$$\frac{dy}{dx} = \frac{a}{\sqrt{1-x^2}} e^{a\sin^{-1}x} + e^{a\sin^{-1}x} \frac{dv}{dx} \quad \text{--- (1)}$$

Now again differentiating eqn (1) with respect x we get

$$\frac{d^2y}{dx^2} = \frac{d}{dx}\left(\frac{dy}{dx}\right) = \frac{d}{dx}\left[\frac{a}{\sqrt{1-x^2}} e^{a\sin^{-1}x} + e^{a\sin^{-1}x} \frac{dv}{dx}\right]$$

$$\because d(u+v) = du + dv$$

$$= \frac{d}{dx}\Bigg(\underbrace{\frac{a}{\sqrt{1-x^2}}}_{I} \underbrace{e^{a\sin^{-1}x}}_{II}\Bigg) + \frac{d}{dx}\Bigg(\underbrace{e^{a\sin^{-1}x}}_{I} \underbrace{\frac{dv}{dx}}_{II}\Bigg)$$

Again using chain rule for differentiating

$$= \frac{a}{\sqrt{1-x^2}} \cdot \frac{d}{dx}(e^{a\sin^{-1}x}) + e^{a\sin^{-1}x} \cdot \frac{d}{dx}\left(\frac{a}{\sqrt{1-x^2}}\right)$$

$$+ e^{a\sin^{-1}x} \cdot \frac{d}{dx}\left(\frac{dv}{dx}\right) + \frac{dv}{dx} \cdot \frac{d}{dx}(e^{a\sin^{-1}x})$$

$$= \frac{a}{\sqrt{1-x^2}} e^{a\sin^{-1}x} \cdot \frac{d}{dx}(a\sin^{-1}x) + e^{a\sin^{-1}x} \cdot a \frac{d}{dx}\left(\frac{1}{\sqrt{1-x^2}}\right)$$

$$+ e^{a\sin^{-1}x} \cdot \frac{d^2V}{dx^2} + \frac{dV}{dx} \cdot e^{a\sin^{-1}x} \cdot \frac{d}{dx}(a\sin^{-1}x)$$

Now :-

$$\frac{d(a\sin^{-1}x)}{dx} = a\frac{d(\sin^{-1}x)}{dx} = a \cdot \frac{1}{\sqrt{1-x^2}}$$

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

$$= \frac{-1}{\cancel{2}} \cdot \frac{1}{(1-x^2)^{3/2}} (-\cancel{2}x) = \frac{x}{(1-x^2)^{3/2}}$$

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

So

$$= \frac{a e^{a\sin^{-1}x}}{\sqrt{1-x^2}} \cdot \frac{a}{\sqrt{1-x^2}} + e^{a\sin^{-1}x} \cdot \frac{ax}{(1-x^2)^{3/2}} + e^{a\sin^{-1}x} \cdot \frac{d^2V}{dx^2}$$

$$+ \frac{dV}{dx} e^{a\sin^{-1}x} \cdot \frac{a}{\sqrt{1-x^2}}$$

$$\frac{d^2y}{dx^2} = \frac{a^2 e^{a\sin^{-1}x}}{(1-x^2)} + \frac{ax}{(1-x^2)^{3/2}} e^{a\sin^{-1}x} + e^{a\sin^{-1}x} \frac{d^2V}{dx^2}$$

$$+ \frac{a e^{a\sin^{-1}x}}{\sqrt{1-x^2}} \frac{dV}{dx}$$