You Try It!

$$(Q79)\ \frac{d}{dx}\int_0^{\cos x}(t^4+6)\,dt = \frac{dy}{dx} = ?$$

y

$u = \cos x \Rightarrow du = -\sin x \cdot dx \Rightarrow \frac{du}{dx} = -\sin x$

re-write as:

$$\frac{dy}{dx} = \frac{dy}{du}\cdot\frac{du}{dx} = \frac{d}{du}\int_0^{u}(t^4+6)\,dt \cdot (-\sin x)$$

$$= (u^4+6)\cdot(-\sin x) = (\cos^4 x+6)\cdot(-\sin x)$$

$$(Q80)\ \frac{d}{dw}\int_0^{\sqrt{w}}\ln(x^2+1)\,dx = \frac{dy}{dw} = ?$$

$\sqrt{w} = u \Rightarrow \frac{1}{2}\cdot w^{-1/2}\cdot dw = du \Rightarrow \frac{1}{2\sqrt{w}} = \frac{du}{dw}$

$w = u^2$

re-write as:

$$\frac{dy}{dw} = \frac{dy}{du}\cdot\frac{du}{dw} = \frac{d}{du}\int_0^{u}\ln(x^2+1)\cdot dx\cdot\frac{1}{2\sqrt{w}}$$

$$= \ln(u^2+1)\cdot\frac{1}{2\sqrt{w}} = \frac{\ln(w+1)}{2\sqrt{w}}$$