Laestion # Convert from cylindrical X=ROSO 3 N= Rsin proso =) R= Rsinp y= 2 sin 0; y= Rsin & sin 0 2=2; $2=R\cos\phi$ $\frac{\partial u_r}{\partial R} = \frac{\partial u_r}{\partial v} - \frac{\partial v}{\partial R} + \frac{\partial u_r}{\partial \Theta} - \frac{\partial \theta}{\partial R} + \frac{\partial u_r}{\partial Z} - \frac{\partial z}{\partial R}$ = $\frac{\partial}{\partial r}$ (ux $\cos\theta$ + uy $\sin\theta$). $\frac{\partial}{\partial R}$ (Rsin ϕ) + $\frac{\partial}{\partial \theta}$ (un $\cos\theta$ + uy $\sin\theta$) $\frac{\partial \theta}{\partial R}$ $= \left[\frac{\partial u_n}{\partial r} \cos \theta + \frac{\partial u_n}{\partial r} \sin \theta\right] \cdot \sin \phi + \left[\frac{\partial u_n}{\partial \theta} \cos \theta + u_n(-\sin \theta) + \frac{\partial u_n}{\partial \theta} \sin \theta + \frac{\partial u_n}{\partial \theta} \sin \theta\right]$ =) $\frac{\partial u_r}{\partial R} = \left[\frac{\partial u_n}{\partial r}\cos\theta + \frac{\partial u_n}{\partial r}\sin\theta\right]\sin\phi + \left(\frac{\partial u_n}{\partial \theta}\cos\theta - u_n\sin\theta\right) + \frac{\partial u_n}{\partial \theta}\sin\theta$ + 4y650) 20 $\frac{\partial u_0}{\partial \theta} = \frac{\partial u_0}{\partial r} \cdot \frac{\partial r}{\partial \theta} + \frac{\partial u_0}{\partial \theta} \cdot \frac{\partial \theta}{\partial \theta} + \frac{\partial u_0}{\partial \theta} \cdot \frac{\partial \theta}{\partial \theta}$ = 2 (-runsin 0 + ruy cos 0). 2 (Rsin p)+ 30 (- VUNSINO + VUY 6050)(1) = [-uxsin 0 dv - Asin 0 dux - A un dsin 0 + uy cos 0 dr + 2cos 0 dr + Luy dos of sin p dR + [-unsin 0 dv - 25in 0 dun - 24x 25in 0 dv - 25in 0 dun - 24x 25in 0 tuy 650 20 + 2650 20 + 24y 2650) = [-unsind-rsind dum + ugus 0+ vaso duy] sin p dR + [(-unsin 0 +uycos 0) dr - 2 sin 0 dum + ocos 0 duy - 2 un cos 0 -Luysin 0].

$$\frac{\partial u_2}{\partial \phi} = \frac{\partial u_2}{\partial r} \cdot \frac{\partial r}{\partial \phi} + \frac{\partial u_2}{\partial \phi} \cdot \frac{\partial \varphi}{\partial \phi} + \frac{\partial u_2}{\partial \phi} \cdot \frac{\partial \varphi}{\partial \phi}$$

$$= \frac{\partial u_2}{\partial r} \cdot \frac{\partial}{\partial \phi} \left(R \sin \phi \right) + \frac{\partial u_2}{\partial \phi} \cdot \frac{\partial \varphi}{\partial \phi} + \frac{\partial u_2}{\partial \phi} \cdot \frac{\partial}{\partial \phi} + \frac{\partial u_2}{\partial \phi} \cdot \frac{\partial u_2}{\partial \phi} + \frac{\partial u_2}{\partial \phi} \cdot \frac{$$