

Ex #4:

Cilíndricas con
 $\dot{\theta} = 0$
 $\Leftrightarrow$

PA

POLARES:

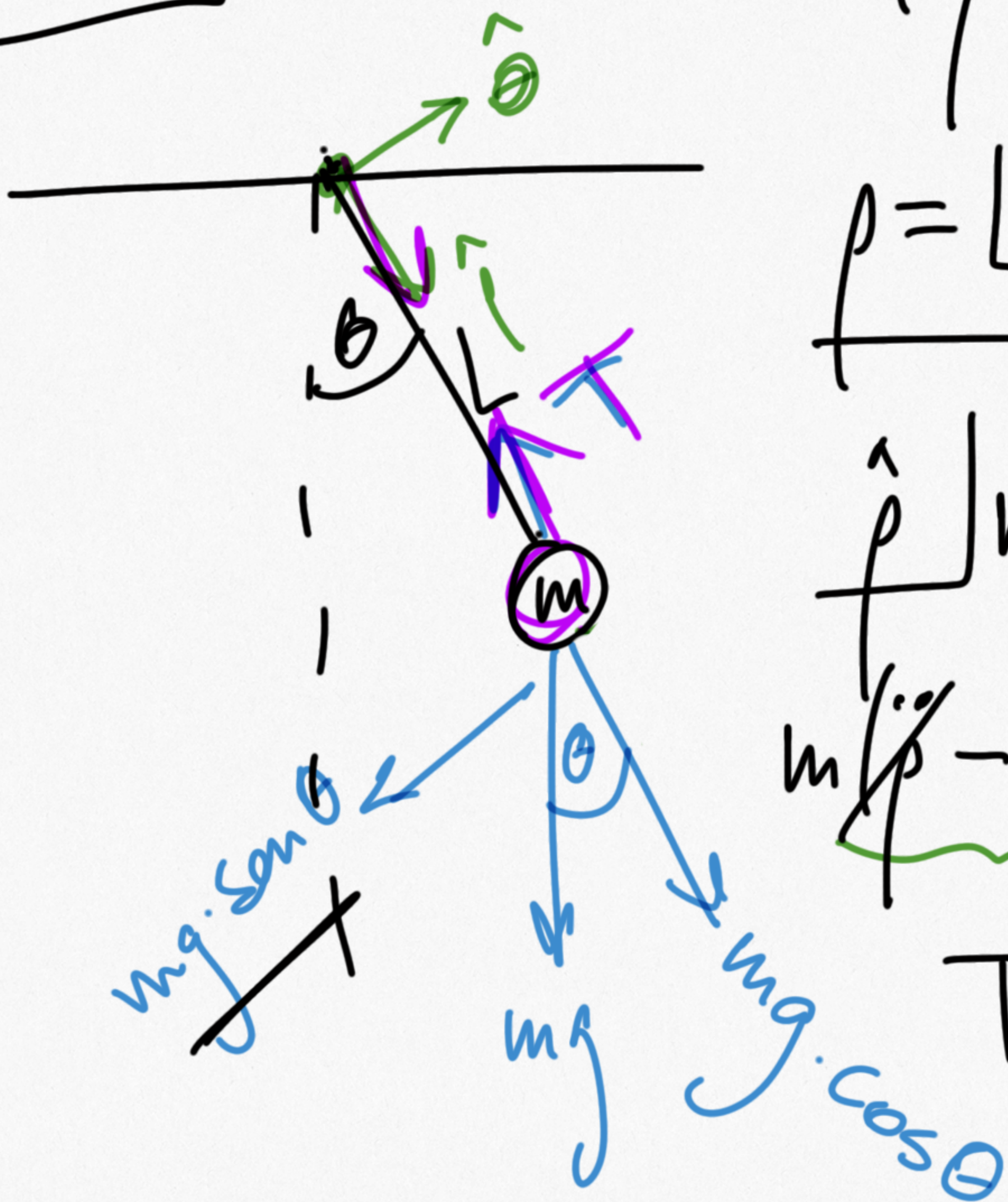
(ρ, θ)

$$\rho = L \Rightarrow \dot{\rho} = \ddot{\rho} = 0$$

$$\hat{\rho} \cdot m \cdot a_{\rho} = mg \cos \theta - T$$

$$m(\ddot{\rho} - \rho \dot{\theta}^2) = mg \cos \theta - T$$

$$T = mg \cos \theta + mL \dot{\theta}^2$$



$$\hat{\theta} \quad m \cdot (2\cancel{\dot{\theta}} + \ddot{\theta}) = -mg \sin \theta$$

$$\dot{\theta} \quad m L \ddot{\theta} = -mg \sin \theta$$

$$\int L \dot{\theta} d\dot{\theta} = \int -g \sin \theta d\theta$$

$$\dot{\theta}(0) = 0$$

$$\theta(0)$$

$$\ddot{\theta} = \frac{d\dot{\theta}}{d\theta} \dot{\theta}$$

$$L \frac{\dot{\theta}^2}{2} = -g(-\cos \theta) \Big|_{\theta(0)}^{\theta} = g(\cos \theta - \cos \theta_0)$$

$$\dot{\theta}^2 = \frac{2g}{L} (\cos \theta - \cos \theta_0)$$

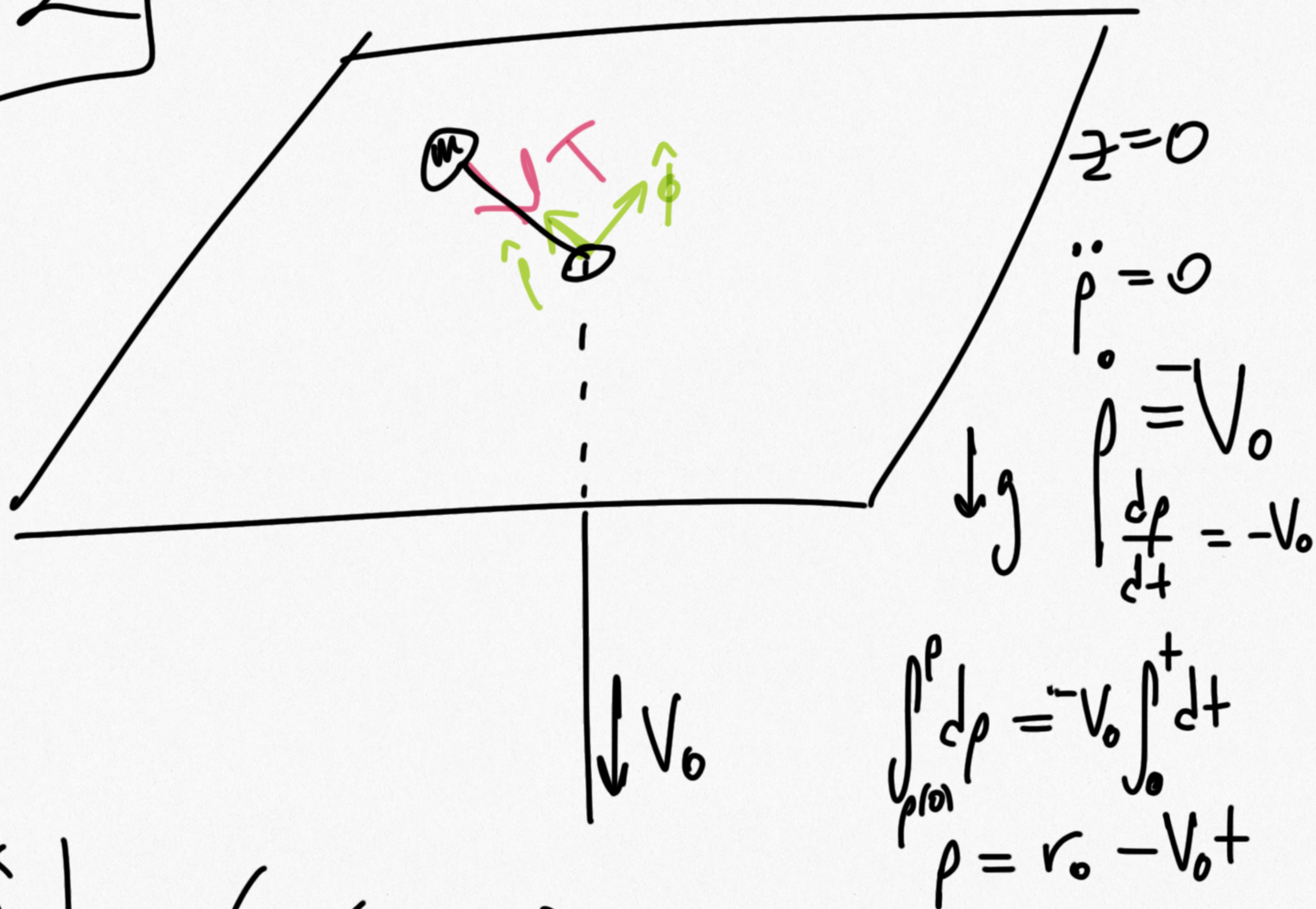
$$T = mg \cos \theta + mL \dot{\theta}^2$$

$$T = mg \cos \theta + 2mg (\cos \theta - \cos \theta_0)$$

P2

$$\rho(t=0) = r_0$$

Tensión?



$$\hat{\rho} \quad m(\ddot{\rho} - \rho \dot{\phi}^2) = -T$$

$$m(-r_0 + V_0 t) \dot{\phi}^2 = -T$$

$$T = m(r_0 - V_0 t) \dot{\phi}^2$$

$$\hat{\phi} \quad \mu (2\dot{\phi} + \rho\ddot{\phi}) = 0$$



$$-2V_0\dot{\phi} = (r_0 - V_0 t)\dot{\phi}$$

$$2V_0\dot{\phi} = (r_0 - V_0 t) \frac{d\dot{\phi}}{dt} \quad / \cdot dt$$

$$\int_0^+ \frac{2V_0}{r_0 - V_0 t} dt$$

$$= \int_{\dot{\phi}(0)}^{\dot{\phi}} \frac{1}{\dot{\phi}} d\dot{\phi}$$

$$\textcircled{-2} \cdot \int_0^+ \frac{\textcircled{-V_0}}{\textcircled{r_0 - V_0 t}} dt = \ln \dot{\phi} \Big|_{\dot{\phi}(0)}^{\dot{\phi}}$$

$$-2 \cdot \ln(r_0 - V_0 t) \Big|_0^+ = \ln \left(\frac{\dot{\phi}}{\dot{\phi}(0)} \right)$$

$$-2 \cdot \ln(r_0 - V_0 t) \Big|_0^t = \ln \left(\frac{\dot{\phi}}{\dot{\phi}(0)} \right)$$

$$-2 \cdot \ln \left(\frac{r_0 - V_0 t}{r_0} \right) = \ln \left(\frac{\dot{\phi}}{\dot{\phi}(0)} \right) \quad / \exp()$$

$$\left(\frac{r_0 - V_0 t}{r_0} \right)^{-2} = \frac{\dot{\phi}}{\dot{\phi}(0)}$$

$$\dot{\phi} = \dot{\phi}(0) \cdot \frac{r_0^2}{(r_0 - V_0 t)^2}$$

$$\dot{\phi}^2 = \dot{\phi}^2(0) \cdot \frac{r_0^4}{(r_0 - V_0 t)^4}$$

$$\begin{aligned} T &= m(r_0 - V_0 t) \dot{\phi}^2 \\ &= \frac{m(r_0 - V_0 t) r_0^4 \cdot \dot{\phi}^2(0)}{(r_0 - V_0 t)^4} \end{aligned}$$

$$T = \frac{m v_o^4 \cdot \dot{\phi}^2(t)}{(v_o - v_{ot})^3}$$