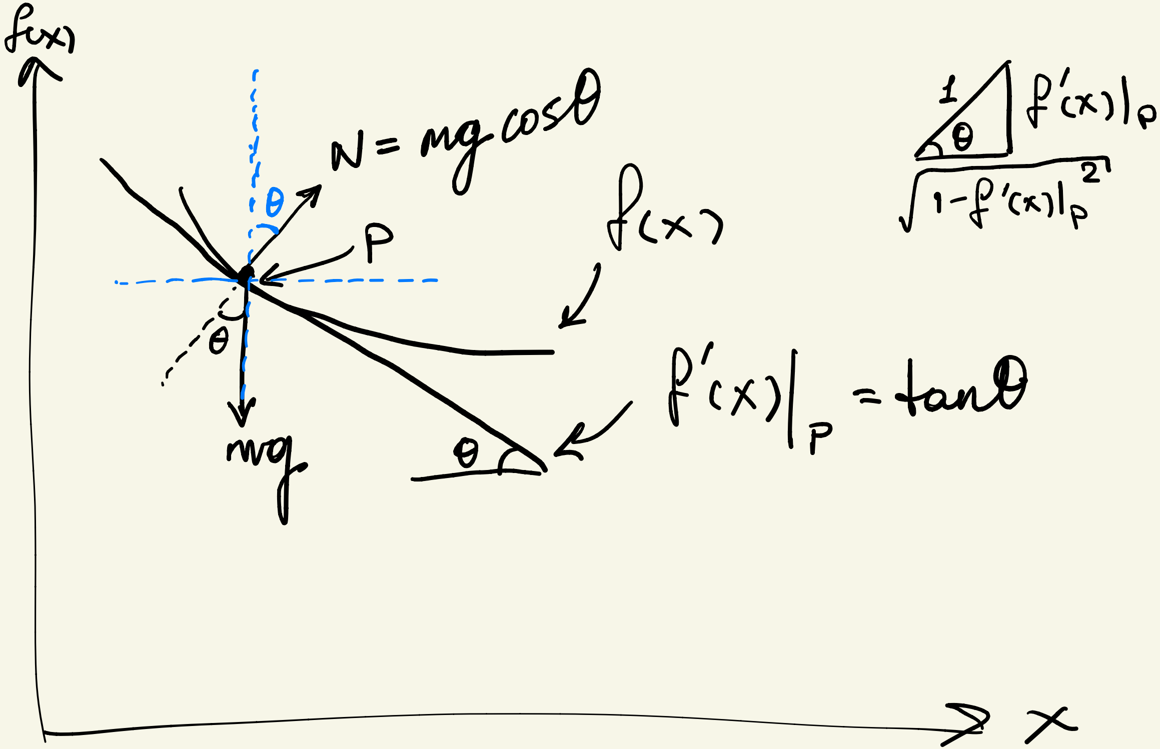


$$\cos\theta = \sqrt{1-f'(x)\big|_p^2}$$

$$F_x = N\sin\theta$$

$$F_y = N\cos\theta - mg$$

$$\vec{F} = m\vec{a} \qquad \vec{a} = \frac{\vec{F}}{m}$$

$$\vec{a} = \frac{d\vec{v}}{dt} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\vec{F}}{m} \qquad \Delta \vec{v} = \frac{\vec{F}}{m} \cdot \Delta t = \vec{v}_{new} - \vec{v}_{old}$$

$$\vec{v}_{new} = \vec{v}_{old} + \frac{\vec{F}}{m} \Delta t$$

$$\frac{d\vec{x}}{dt} = \vec{v}_{old} \qquad \frac{\Delta \vec{x}}{\Delta t} = \vec{v}_{old} \qquad \Delta \vec{x} = \vec{v}_{old} \cdot \Delta t = \vec{x}_{new} - \vec{x}_{old}$$

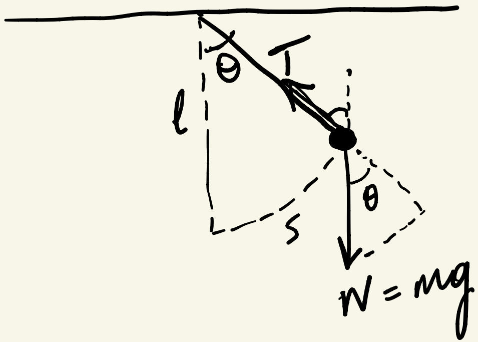
$$\vec{x}_{new} = \vec{x}_{old} + \vec{v}_{old} \cdot \Delta t$$

$$P(\text{decay}) = \frac{\Delta N}{\Delta t} = \frac{dN}{dt}$$

$$N = N_0 e^{-\frac{t}{\tau}}$$

$$\frac{dN}{dt} = N_0 e^{-\frac{t}{\tau}} \left(-\frac{1}{\tau}\right)$$

$$= -\frac{N}{\tau}$$



$m\ddot{s} = F_{\text{along path of constant radius } l} = ml\ddot{\theta} = -mg\sin\theta$

$$\ddot{\theta} = -\frac{g}{l}\sin\theta$$

Let $\dot{\theta} = w = \frac{d\theta}{dt}$ so that $\ddot{\theta} = \dot{w} = \frac{d^2\theta}{dt^2}$

$\dot{w} = -\frac{g}{l}\sin\theta$

$s = l\theta$

$\dot{s} = l\dot{\theta} = lw$

$\frac{dw}{dt} = -\frac{g}{l}\sin\theta$ $\frac{\Delta w}{\Delta t} = -\frac{g}{l}\sin\theta$

$\Delta w = -\frac{g}{l}\sin\theta \cdot \Delta t$ $w_{new} - w_{old} = -\frac{g}{l}\sin\theta \cdot \Delta t$

$w_{new} = w_{old} - \frac{g}{l}\sin\theta \cdot \Delta t$

$\dot{\theta} = w$ $\frac{d\theta}{dt} = w$ $\frac{\Delta\theta}{\Delta t} = w$ $\Delta\theta = w_{old}\Delta t$ $\theta_{new} - \theta_{old} = w_{old}\Delta t$