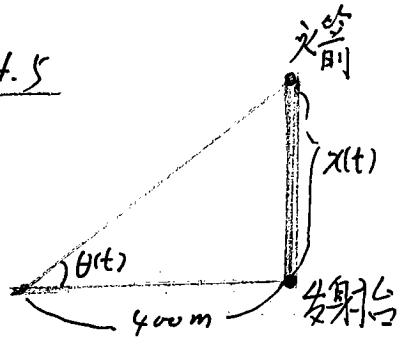
作业2-2

P.84.5



$a(t) = 8\,m/s^2$

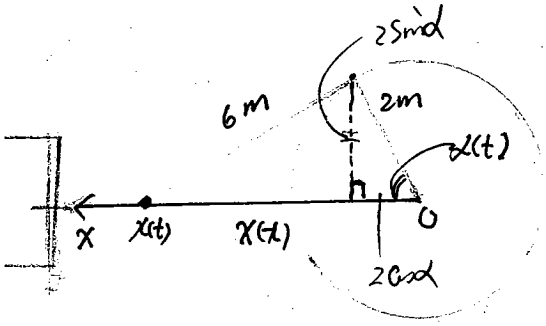
$x(t) = \frac{1}{2}at^2 = \frac{1}{2}\times 8\times t^2 = 4t^2$

$\theta(t) = \operatorname{arctan}\frac{x(t)}{400} = \operatorname{arctan}\frac{4t^2}{400} = \operatorname{arctan}\frac{t^2}{100}$

$\theta'(t) = \frac{1}{1+\frac{t^4}{100^2}}\cdot\frac{2t}{100} = \frac{100\times 2t}{100^2+t^4}$

$\theta'(10) = \frac{100\times 2\times 10}{100^2+10^4} = \frac{100\times 2\times 10}{2\times 100^2} = \frac{1}{10}$.

P.85.6



$x(t) = 2\cos\alpha + \sqrt{36-(2\sin\alpha)^2} = 2\cos\alpha + \sqrt{36-4\sin^2\alpha}$

$\frac{dx}{dt} = 2\cdot(-\sin\alpha)\cdot\frac{d\alpha}{dt} + \frac{-8\sin\alpha\cdot\cos\alpha}{2\sqrt{36-4\sin^2\alpha}}\cdot\frac{d\alpha}{dt}$

注意: $\frac{d\alpha}{dt} = 4\times 2\pi = 8\pi$

当 $\alpha = \frac{\pi}{2}$ 时

$\left.\frac{dx}{dt}\right|_{\alpha=\frac{\pi}{2}} = -2\times 8\pi + 0\times 8\pi = -16\pi$

"-"表示向左移动，与x轴的方向相反。