



① $x = ax - bx + y$
 $y = -cy + dx + y$

$\frac{x}{y} = \frac{ax - bx}{-cy + dx} = \frac{x(a-b)}{y(dx-c)}$

$\frac{d(\frac{dx}{x} - c)}{\frac{dx}{x}} = \frac{y}{y} (\frac{a-b}{y})$

$\int x(d - \frac{c}{x}) = \int y(\frac{a}{y} - b)$

$dx - c \ln|x| = a \ln|y| - by + C$

④



$\Sigma F = m \cdot a$
 $S_x = G_x = -mg \sin \theta$
 $a = 0$
 $-mg \sin \theta = m \cdot 0$
 $(0 - g \sin \theta = 0$
 $0 + \frac{g}{c} \sin \theta = 0$

⑤

$0 + \frac{g}{c} \sin \theta = 0 \quad | \cdot m \cdot \dot{\theta}$

$m \dot{\theta} \ddot{\theta} + m g \sin \theta = 0$

$\int m \dot{\theta}^2 \ddot{\theta} + \int m g \sin \theta = 0$

$m \dot{\theta}^2 \int \ddot{\theta} + m g \int \sin \theta = 0$

$m \dot{\theta}^2 \frac{1}{2} \dot{\theta}^2 + m g (-\cos \theta) + C_1 + C_2 = 0$

$m \frac{1}{2} (\dot{\theta})^2 - m g \cos \theta = C$

$\int \ddot{\theta} d\theta \quad \dot{\theta} = 0$
 $\int \ddot{\theta} \frac{d\theta}{\dot{\theta}}$
 $\int \dot{\theta} d\theta = \frac{1}{2} \dot{\theta}^2 = \frac{1}{2} \dot{\theta}^2 + C$

$\int g \sin \theta d\theta$
 $= -\cos \theta + C$

⑥



$r = \frac{1}{2} \sin \theta \cdot \cos \theta \leq \frac{r^2}{2} \theta + \leq \frac{1}{2} \tan \theta$

$\frac{1}{2} \sin \theta \leq \frac{\theta}{2} \leq \frac{1}{2} \frac{\sin \theta}{\cos \theta}$

$\cos \theta \sin \theta \leq \theta \leq \frac{\sin \theta}{\cos \theta} \quad | \cdot \sin \theta$

$\cos \theta \leq \frac{\theta}{\sin \theta} \leq \frac{1}{\cos \theta}$

$\lim_{\theta \rightarrow 0} \frac{1}{\cos \theta} \geq \frac{\sin \theta}{\theta} \geq \cos \theta$

$\lim_{\theta \rightarrow 0} \frac{1}{1} \geq \frac{\sin \theta}{\theta} \geq 1$

$\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$

$\pi r^2 \cdot \frac{\theta}{2\pi}$

$\frac{\pi r^2}{2}$

$\frac{\theta}{2\pi}$

$\frac{\theta}{2}$

$\frac{r^2 \theta}{2}$

$$\textcircled{2} \quad \ddot{\theta} + \frac{g}{\ell} \theta = 0$$

$$\theta(t) = e^{\lambda t}$$

$$\lambda^2 e^{\lambda t} + \frac{g}{\ell} e^{\lambda t} = 0$$

$$\lambda^2 + \frac{g}{\ell} = 0$$

$$\lambda = \frac{-0 \pm \sqrt{0 - 4 \cdot \frac{g}{\ell}}}{2 \cdot 1} = \pm \frac{\sqrt{4 \cdot \frac{g}{\ell}}}{2} = \pm i \sqrt{\frac{g}{\ell}}$$

$$\theta(t) = c_1 \cos\left(\sqrt{\frac{g}{\ell}} t\right) + c_2 \sin\left(\sqrt{\frac{g}{\ell}} t\right)$$