

$$(2) \quad \frac{d}{dt} \left[\frac{\partial L}{\partial \dot{x}_1} \right] - \frac{\partial L}{\partial x_1} = F(t) = u$$

$$\frac{d}{dt} [(M+m)\dot{x}_1 + ml\dot{x}_2 \cos x_1] = u$$

$$(M+m)\ddot{x}_1 + (ml \cos x_1)\ddot{x}_2 - (ml\dot{x}_2 \sin x_1)\dot{x}_1 = u$$

$$(M+m)\ddot{x}_1 + (ml \cos x_1)\ddot{x}_2 = u + ml\dot{x}_2^2 \sin x_1$$

Dengan (A) dan (B), dapat dicari --- (B)

$$\begin{aligned} \dot{x}_2 &= f(x, u, t) = \dots \\ \dot{x}_1 &= g(x, u, t) = \dots \end{aligned}$$

→ MATLAB function

dari A = $\ddot{x}_2 = \frac{g \sin x_1 - \dot{x}_1 \cos x_1}{l} \rightarrow (B)$