ECE 463/663 Handout #6

LaGrangian Dynamics

Assume

$$L = \cos(x) + \frac{1}{3} x \dot{x}^2 t^3$$

Determine

$$F = \frac{d}{dt}\left(\frac{\partial L}{\partial \dot{x}}\right) - \left(\frac{\partial L}{\partial x}\right)$$

Solution

$$L = \cos(x) + \frac{1}{3} x \dot{x}^2 t^3$$

$$F = \frac{d}{dt}\left(\frac{\partial L}{\partial \dot{x}}\right) - \left(\frac{\partial L}{\partial x}\right)$$

$$F = \frac{d}{dt}\left(\frac{2}{3} x \dot{x} t^3\right) - \left(-\sin(x) + \frac{1}{3}\dot{x}^2 t^3\right)$$

$$F = \left(\frac{2}{3}\dot{x}^2 t^3 + \frac{2}{3} x \ddot{x} t^3 + \frac{6}{3} x \dot{x} t^2\right) + \left(\sin(x) - \frac{1}{3}\dot{x}^2 t^3\right)$$