

ROTATION

Example : child's top.

$$\alpha = 5t^3 - 4t$$

$$\omega_0 = 5 \text{ rad s}^{-1}$$

$$\theta_0 = 2 \text{ rad}$$

$$a) \int_0^t 1 d\omega = \int_0^t \alpha dt$$

$$\omega \Big|_0^t = \int_0^t 5t^3 - 4t dt$$

$$\omega(t) - \omega(0) = \left. \frac{5}{4}t^4 - 2t^2 \right|_0^t$$

$$\omega(t) - 5 = \frac{5}{4}t^4 - 2t^2$$

$$\omega(t) = \frac{5}{4}t^4 - 2t^2 + 5.$$

$$b) \int_0^t 1 d\theta = \int \omega dt$$

$$\theta \Big|_0^t = \int_0^t \left(\frac{5}{4}t^4 - 2t^2 + 5 \right) dt$$

$$\theta(t) - \theta(0) = \frac{1}{4}t^5 - \frac{2}{3}t^3 + 5t$$

$$\theta(t) - 2 = \frac{1}{4}t^5 - \frac{2}{3}t^3 + 5t$$

$$\theta(t) = \frac{1}{4}t^5 - \frac{2}{3}t^3 + 5t + 2.$$

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