

$$2. \quad \omega = ? \quad \omega = \frac{\Delta\theta}{\Delta t} = \frac{2\pi \text{ rad}}{60 \text{ s}} = \frac{\pi}{30} \text{ rad/s} = 0.105 \text{ rad/s}$$

$$b) \quad \omega = \frac{2\pi \text{ rad}}{3600 \text{ s}} = \frac{\pi}{1800} \text{ rad/s} = 1.75 \times 10^{-3} \text{ rad/s}$$

$$c) \quad \omega = \frac{2\pi}{43200} \rightarrow 1.45 \times 10^{-4} \text{ rad/s}$$

$$6. \quad \theta(t) = 4.0t - 3.0t^2 + t^3$$

$$a) \quad \omega(2.0) = ?$$

$$\omega(t) = \frac{d\theta}{dt} = 4 - 6t + 3t^2$$

$$\omega(2) = 4 - 6(2) + 3(2)^2 = 4 \text{ rad/s}$$

$$b) \quad \omega(4) = ? = 4 - 6(4) + 3(4)^2 = 28 \text{ rad/s}$$

$$c) \quad \alpha_{\text{avg}} = ? \quad (2-4\text{s})$$

$$\alpha = \frac{\Delta\omega}{\Delta t} = \frac{28 - 4}{2} = 12 \text{ rad/s}^2$$

$$d) \quad \alpha(2) = ?$$

$$\alpha = \frac{d\omega}{dt} = -6 + 6t$$

$$\alpha(2) = -6 + 6(2) = 6 \text{ rad/s}^2$$

$$e) \quad \alpha(4) = ? = -6 + 6(4) = 18 \text{ rad/s}^2$$

5. $\omega_{avg} = ?$ $\omega_{avg} = \frac{\Delta \theta}{\Delta t}$

$$\Delta y = -10 \text{ m}$$

$$v_0 = 0$$

$$a = -9.8 \text{ m/s}^2$$

$$t = ?$$

$$\Delta y = v_0 t + \frac{1}{2} a t^2$$

$$-10 = 0 - 4.9 t^2$$

$$t = 1.43 \text{ s}$$

$$= \frac{(2.5)(2\pi)}{1.43 \text{ s}}$$

$$\omega_{avg} = 11 \text{ rad/s}$$

4. $\theta(t) = 2 + 4t^2 + 2t^3$

a) $\theta(0) = ? = \underline{2 \text{ rad}}$

b) $\omega(0) = ?$ $\omega = \frac{d\theta}{dt} = 8t + 6t^2$
 $\omega(0) = \underline{0}$

c) $\omega(4) = ?$

$\omega(4) = 8(4) + 6(4)^2 = \underline{128 \text{ rad/s}}$

d) $\alpha(2) = ?$ $\alpha(t) = \frac{d\omega}{dt} = 8 + 12t$

$\alpha(2) = 8 + 12(2) = \underline{32 \text{ rad/s}^2}$

e) is α constant?

NO $\alpha(t) = 8 + 12t$

changes with time

(it EVOLVES!)