

Solution for HW #1

①(a) $x(t) = \underbrace{2 \cos(2t)}_{\text{periodic with period } \pi} - \underbrace{3 \sin(3t)}_{\text{periodic with period } \frac{2\pi}{3}}$

Since ratio of periods = $\frac{\pi}{2\pi/3} = \frac{3}{2} = \text{rational}$
then this function is periodic

period is smallest common multiple
 $= 2\pi$

①(n) $x(t) = \underbrace{t u(t)}_{\text{not periodic}} + \underbrace{\sin(\pi t/2)}_{\text{periodic}}$

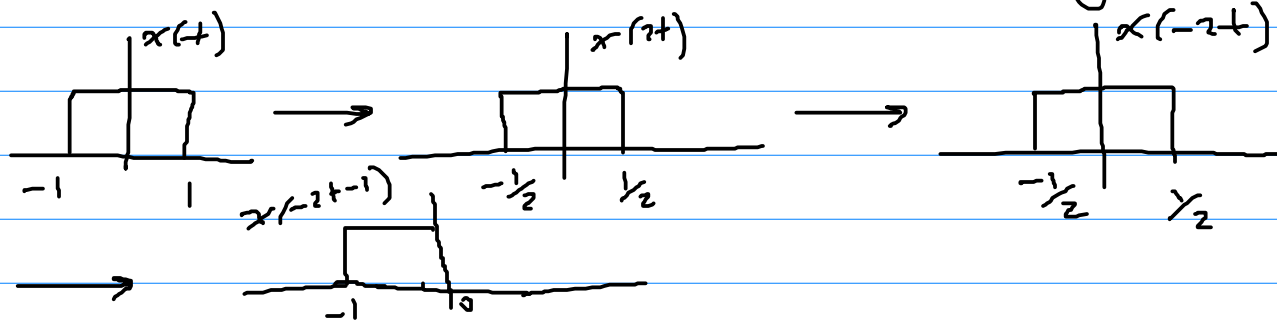
$\Rightarrow x(t)$ is not periodic

②(b) $x(t) = u(t) \cos(t)$

since $E = \int_{-\infty}^{\infty} x^2(t) dt = \infty$

then it is infinite energy signal

③(b)



(4)(b)

$$x(t) = u(t)$$

$$x(t) = x_e(t) + x_o(t)$$

$$x_e(t) = \frac{1}{2} \left[\underbrace{u(t) + u(-t)}_1 \right] = \frac{1}{2}$$

$$x_o(t) = \frac{1}{2} \left[u(t) - u(-t) \right]$$