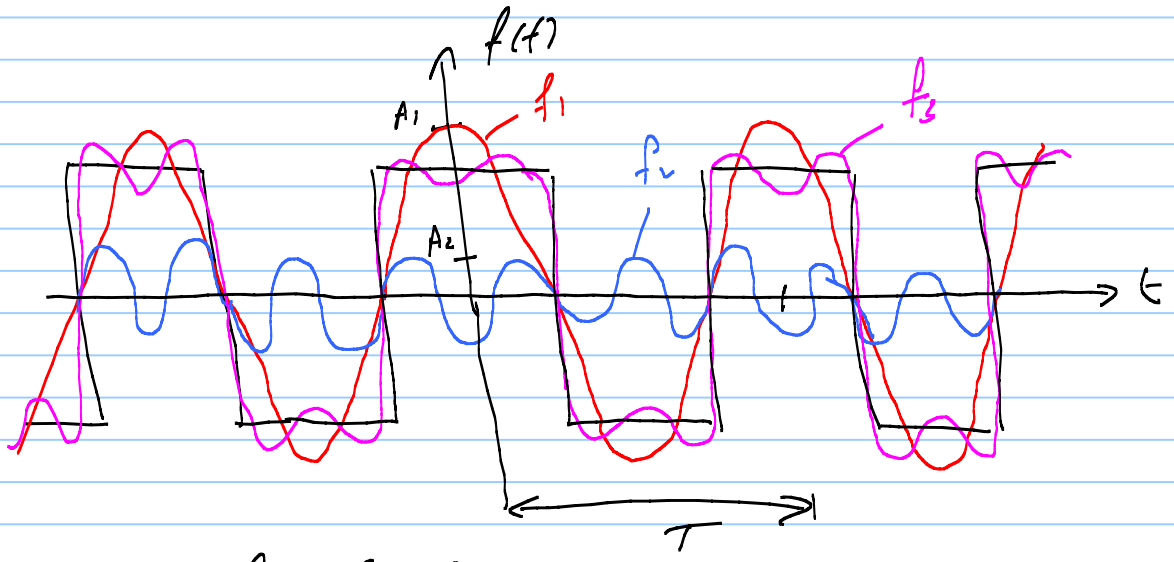
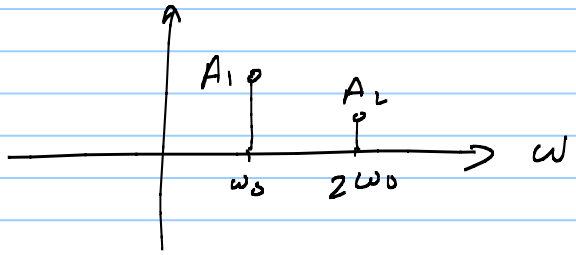
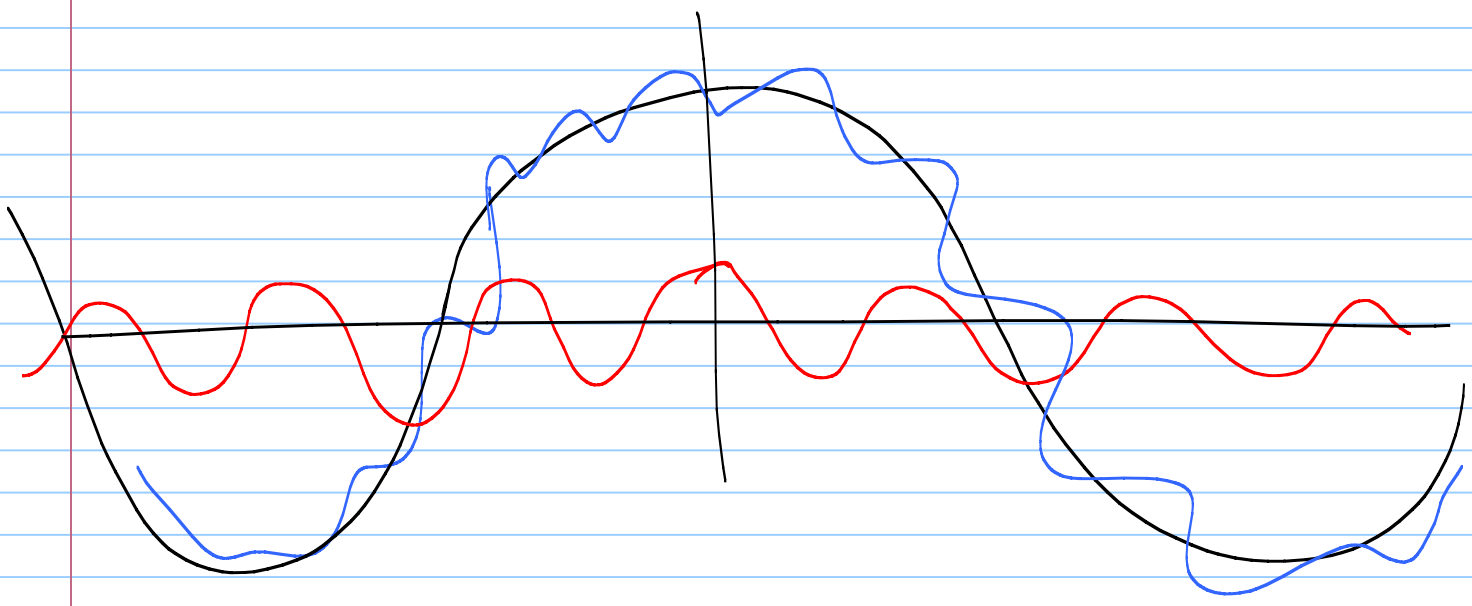
Note Title 2/19/2019

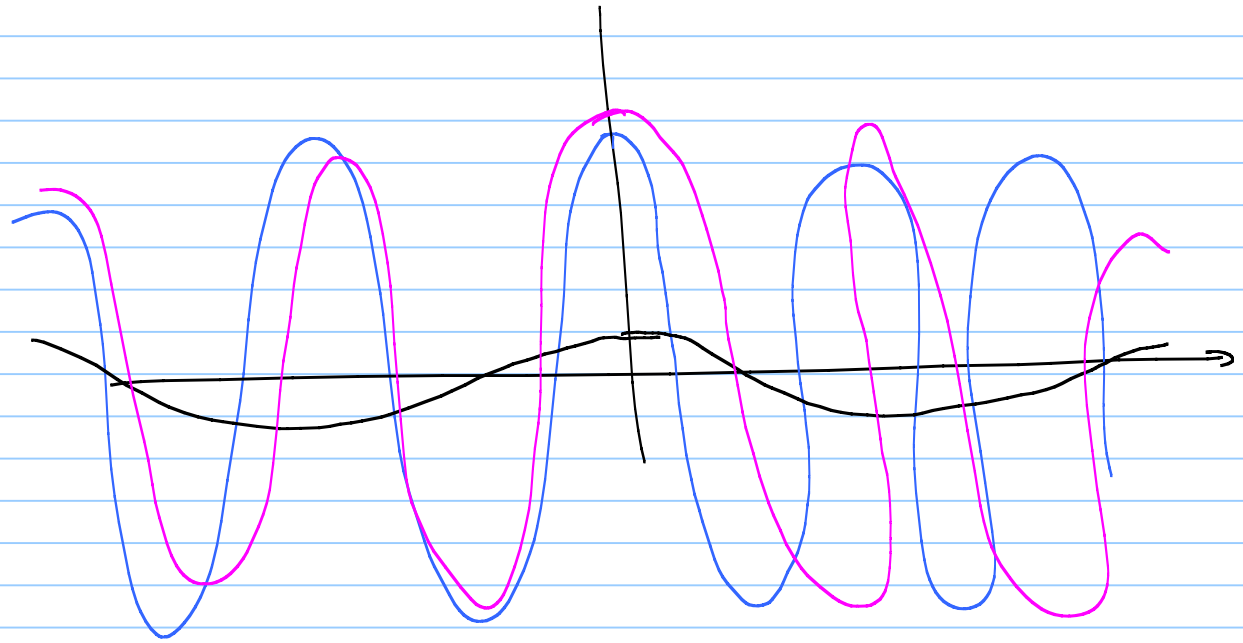


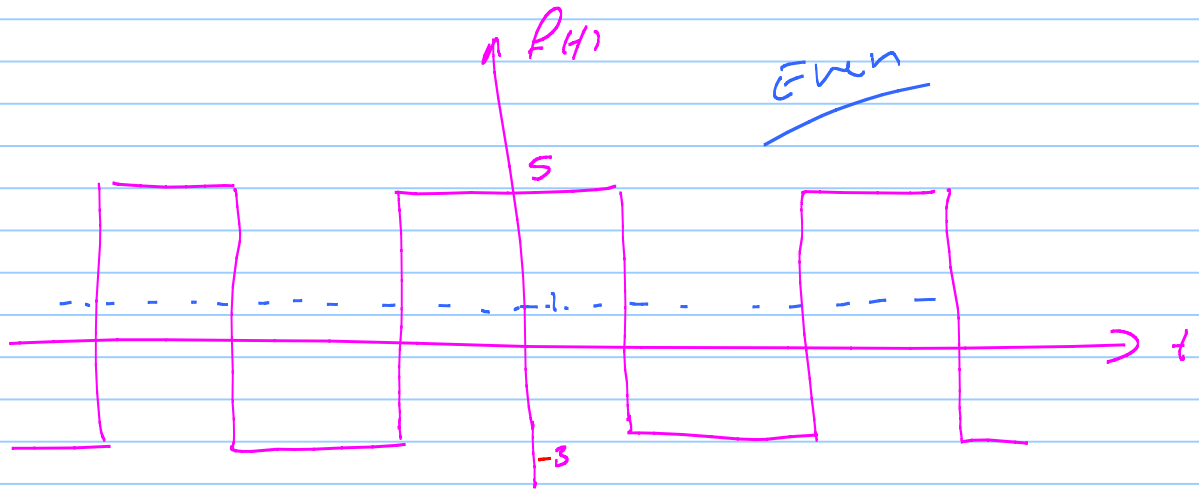
$f_3 = f_1 + f_2$

$\omega_0 = \frac{2\pi}{T}$



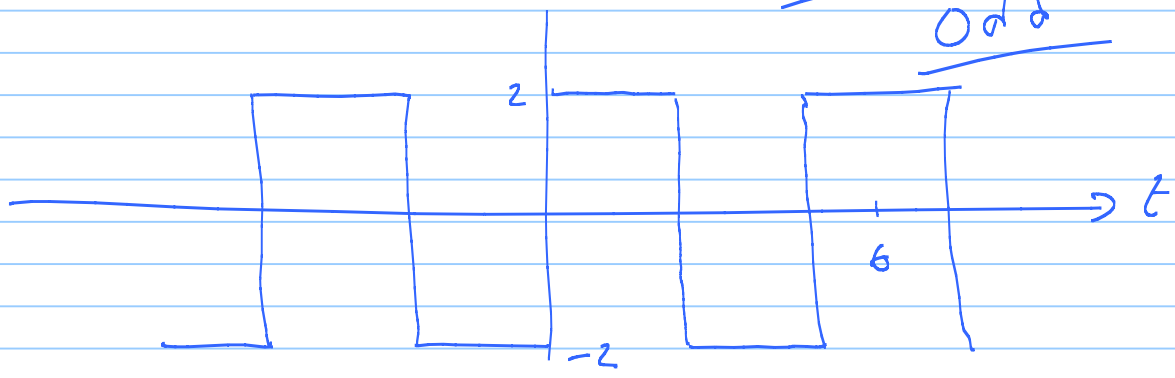






Even

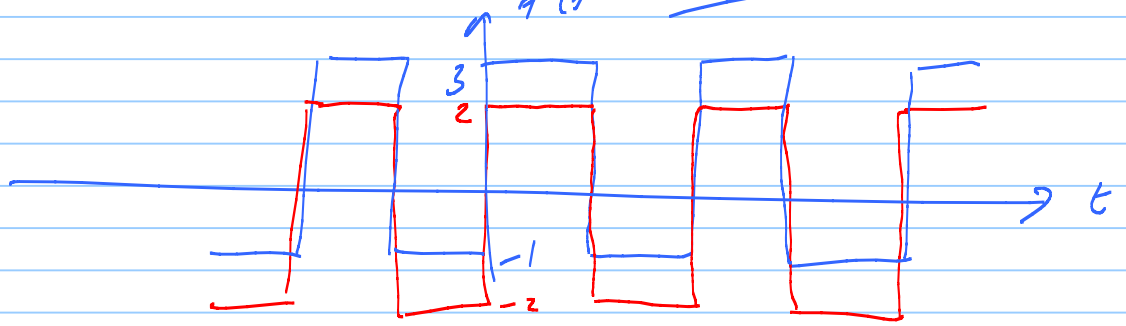
$a_0 = 1$; $b_k = 0$; $a_k = ?$



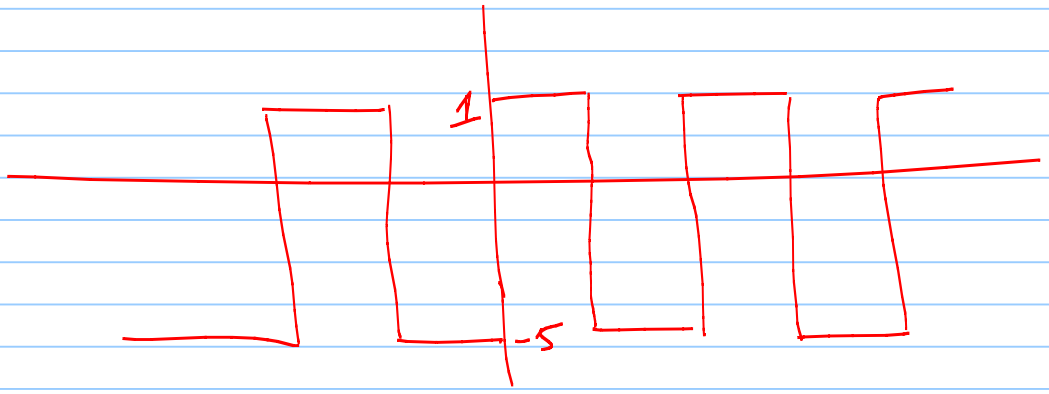
Odd

$a_0 = 0$; $a_k = 0$; $b_k = ?$

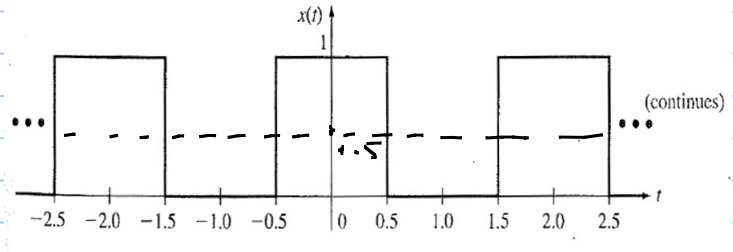
not odd nor even



$a_0 = 1$; $a_k = 0$; $b_k = ?$



$a_0 = -2$



$a_0 = 0.5$; $b_k = 0$, $T = 2$; $\omega_0 = \frac{2\pi}{T} = \pi$

$$a_k = \frac{2}{T}\int_0^T x(t)\cos(k\omega_0 t)dt = \frac{2}{T}\int_{-\frac{T}{2}}^{\frac{T}{2}} x(t)\cos(k\omega_0 t)dt \qquad k = 1,2,\ldots$$

$$a_k = \frac{2}{2}\int_{-1}^{1} x(t)\cos(k\pi t)dt = \frac{2}{2}\int_{-0.5}^{0.5}\cos(k\pi t)dt$$

$$= \frac{2}{2}\int_{-1}^{-0.5}(0)\cos(k\pi t)dt + \int_{-0.5}^{0.5}(1)\cos(k\pi t)dt + \int_{0.5}^{1}(0)\cos(k\pi t)dt$$

$$a_k = \frac{1}{k\pi}\sin(k\pi t)\Big|_{-0.5}^{0.5} = \frac{1}{k\pi}\left[\sin(0.5k\pi) - \sin(-0.5k\pi)\right]$$

$$= \frac{1}{k\pi}\left[\sin(0.5k\pi) + \sin(0.5k\pi)\right]$$

$$a_k = \frac{2}{k\pi}\sin\left(\frac{k\pi}{2}\right)$$

$$x(t) = a_0 + \sum_{k=1}^{N}[a_k\cos(k\omega_0 t) + b_k\sin(k\omega_0 t)] \qquad -\infty < t < \infty$$

$$x(t) = 0.5 + \sum_{k=1}^{N}\left[\frac{2}{k\pi}\sin\left(\frac{k\pi}{2}\right)\right]\cos(k\pi t) + 0$$