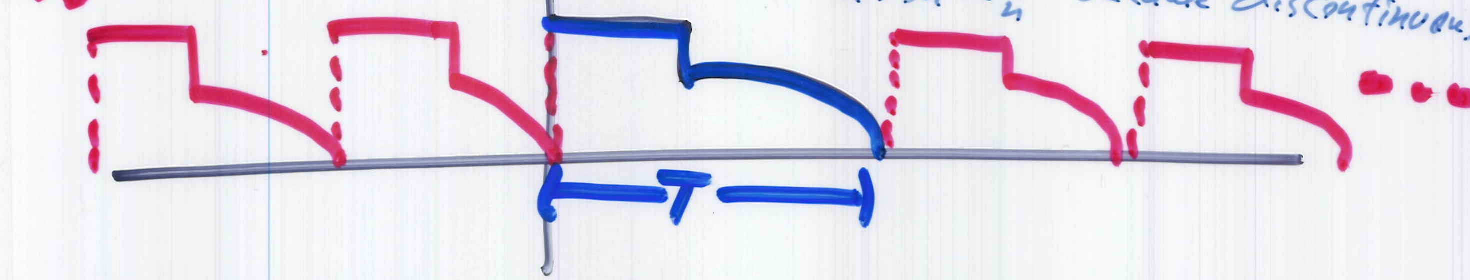
$$F(t) = \frac{a_0}{2} + \sum_{n=1}^{\infty} \left[a_n \cos(n\omega t) + b_n \sin(n\omega t) \right]$$

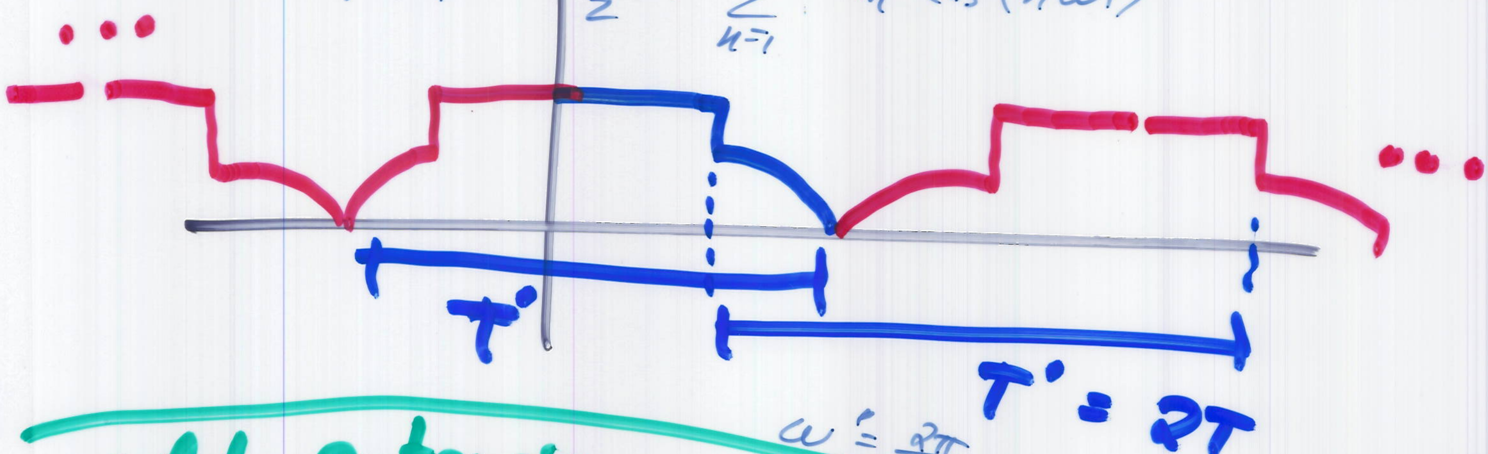
$a_n, b_n \propto \frac{1}{n}$ because discontinuous



even extension

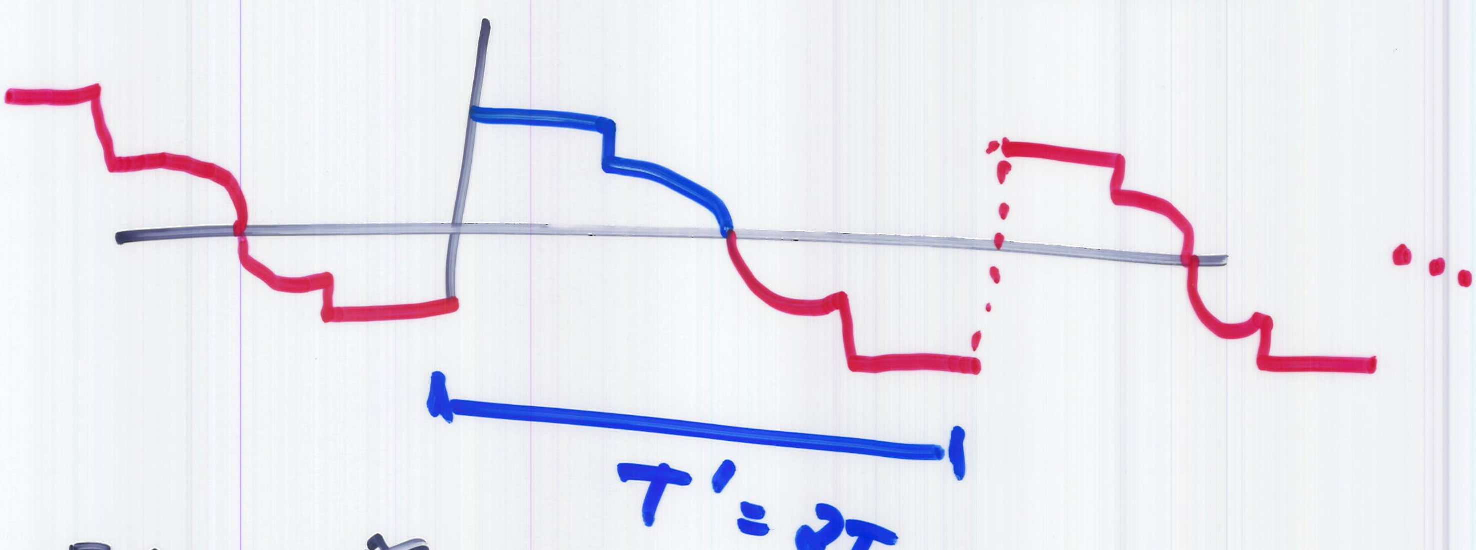
continuous $a_n, b_n \propto \frac{1}{n^2}$

$$F(t) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos(n\omega' t)$$

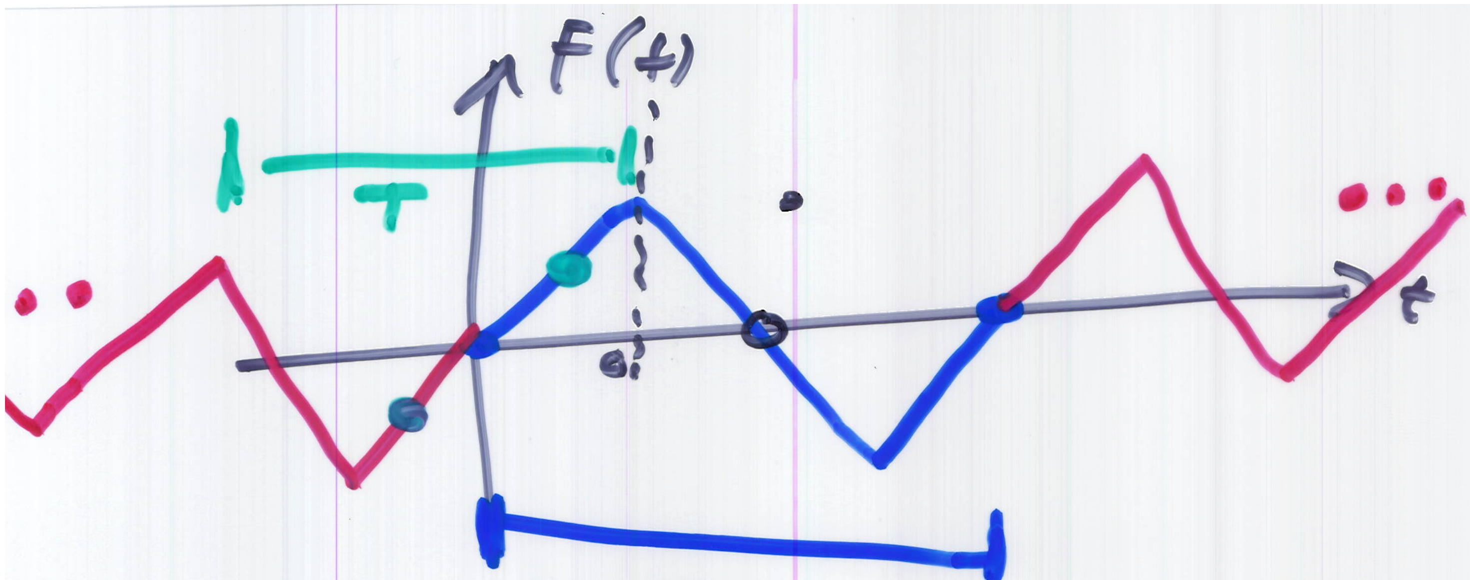


$\omega' = \frac{2\pi}{T'}$

odd extension



$$F(t) = \sum_{n=1}^{\infty} \underset{\propto \frac{1}{n}}{b_n} \sin(n\omega' t)$$



T period $= \frac{2\pi}{\omega}$

Odd: $F(-t) = -F(t)$

$\omega = \frac{2\pi}{T} = \frac{2\pi}{4}$

even $F(-t) = +F(t)$

<u>neither</u>

$b_1 = \frac{8}{\pi^2}$

$b_2 = 0$

$b_3 = -\frac{8}{9\pi^2}$

$b_4 = 0$

$b_5 = \frac{8}{25\pi^2}$

$b_6 = 0$

$\vdots$

$$b_n = \frac{8}{\pi^2 n^2}(-1)^{\frac{n-1}{2}}\left[\frac{1+(-1)^{n+1}}{2}\right]$$

Great convergence.

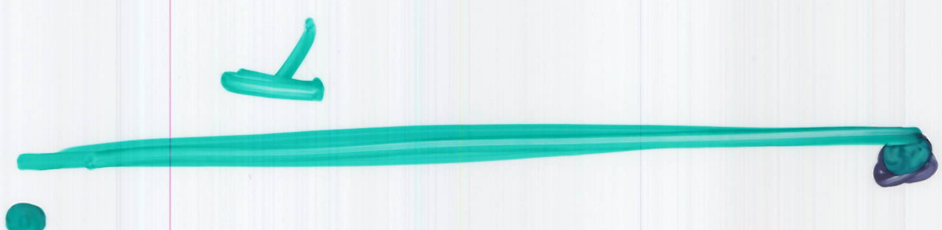
$a_0 = 0$

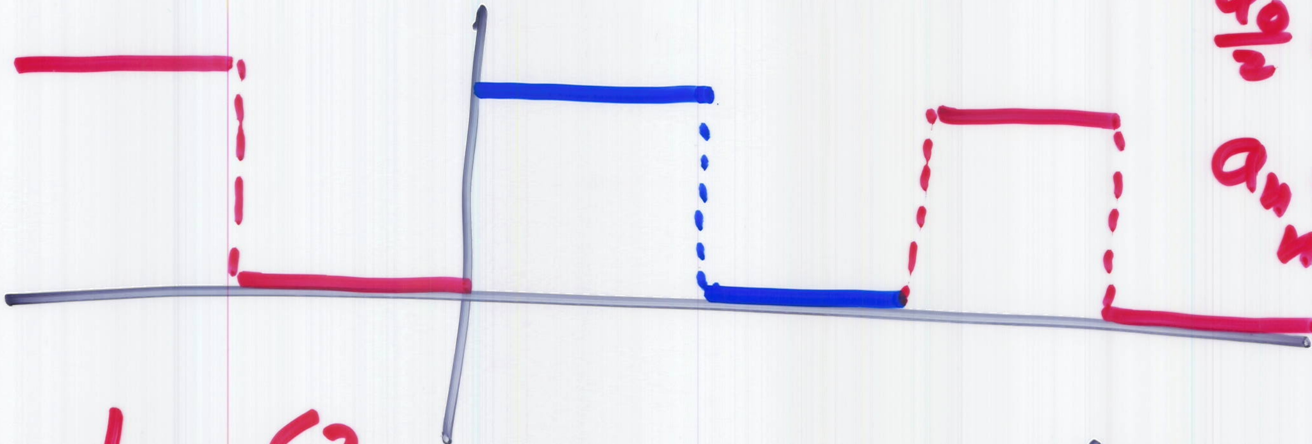
$a_n = 0 \quad \forall n$

$$F(t) = \frac{a_0}{2} + \sum_{n=1}^{\infty}\left[a_n \cos(n\omega t) + b_n \sin(n\omega t)\right]$$

$$F(t) = b_1 \sin(\omega t) + b_3 \sin(3\omega t) + b_5 \sin(5\omega t)$$

$$\doteq \frac{8}{\pi^2}\sin\left(\frac{\pi}{2}t\right) - \frac{8}{9\pi^2}\sin\left(\frac{3\pi}{2}t\right) + \frac{8}{25\pi^2}\sin\left(\frac{5\pi}{2}t\right)$$





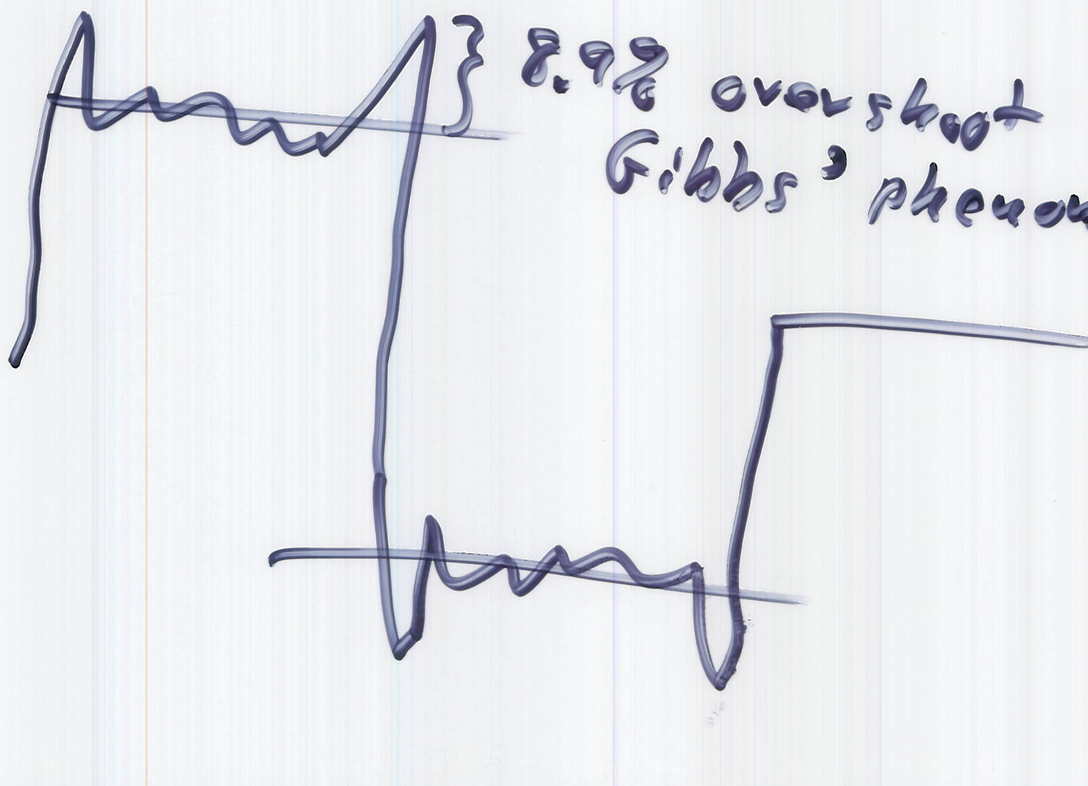
$$\frac{a_0}{2} = \frac{1}{2}$$

$$a_n = 0, \quad n \geq 1$$

$$b_n = \begin{cases} \dfrac{2}{\pi n}, & n \text{ odd} \\ 0, & n \text{ even} \end{cases}$$

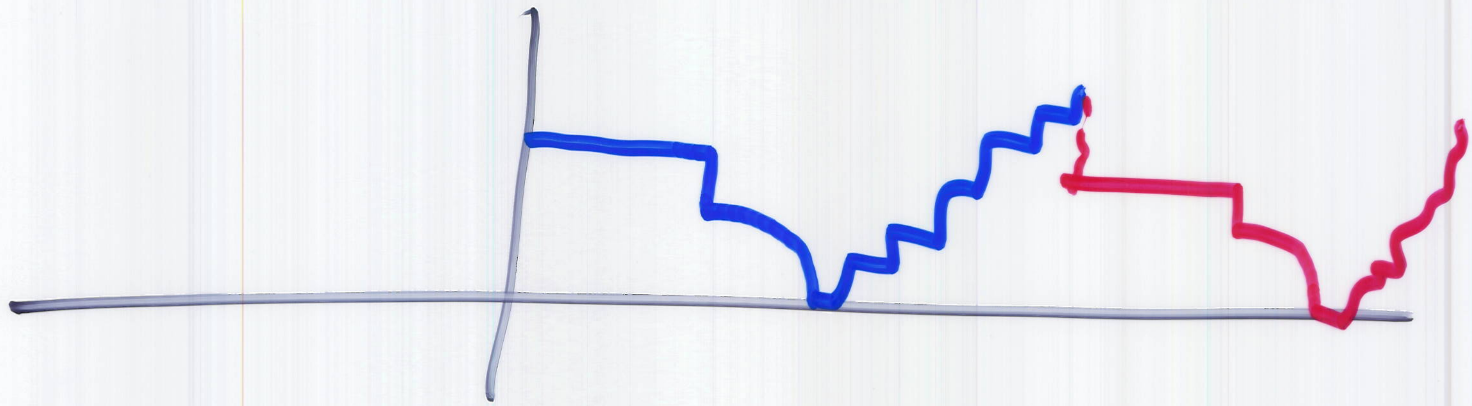
discontinuity $\to b_n \propto \frac{1}{n}$

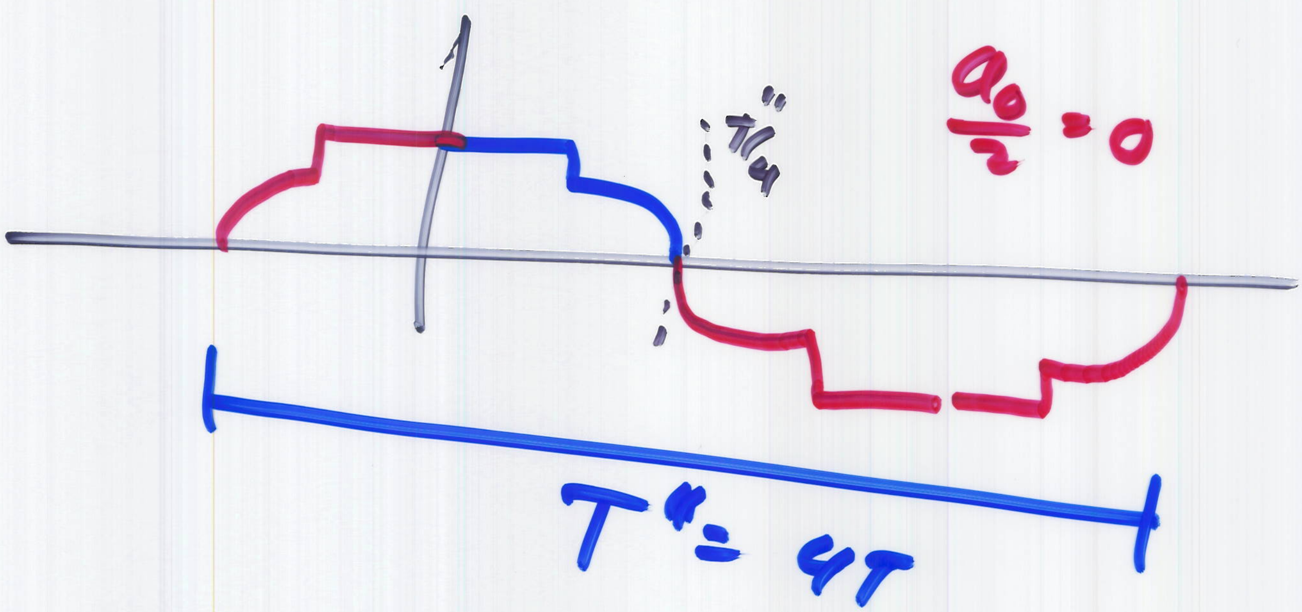
"almost odd" – would be odd if shifted vertically $\frac{1}{2}$ unit down



8.9% overshoot

Gibbs' phenomenon





T/4
$\frac{a_0}{2} = 0$
$T^* = 4T$