

Unit 3 Lesson 2

• An even function is symmetric across the y axis

• An odd function follows $f(t) = -f(-t)$

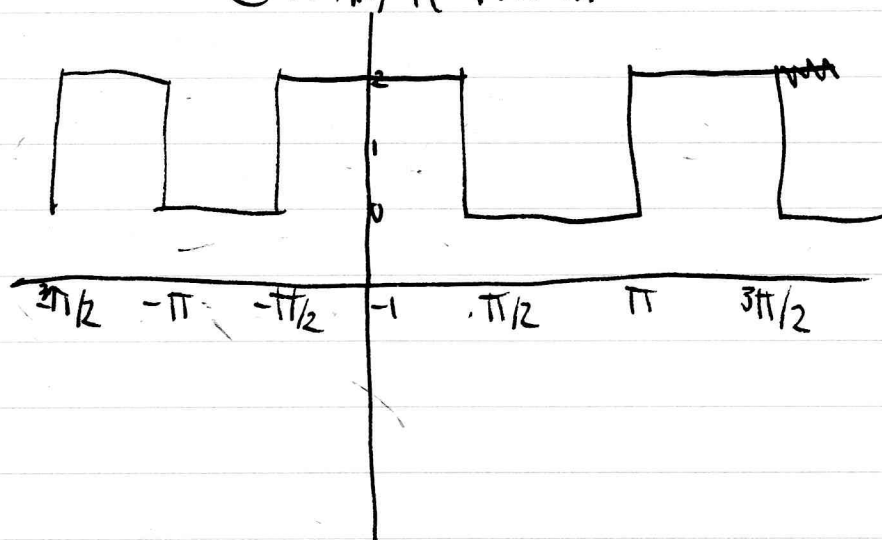
• If $f(t)$ is even, then we have Fourier series with

$$b_n = 0, \quad a_n = \frac{2}{L} \int_0^L f(t) \cos\left(n \frac{\pi}{L} t\right) dt,$$

odd for

$$a_n = 0, \quad b_n = \frac{2}{L} \int_0^L f(t) \sin\left(n \frac{\pi}{L} t\right) dt$$

Example Problem



1: $f(t)$ is even, so we have $b_n = 0$;

$$\begin{aligned}
 a_n &= \frac{1}{\pi} \int_{-\pi}^{\pi} f(t) \cos(nt) dt \\
 &= \frac{2}{\pi} \left(\int_0^{\pi/2} 1 \cos(nt) dt + \int_{\pi/2}^{\pi} 0 \cos(nt) dt \right) \\
 &= \frac{4}{n\pi} \sin(n\pi/2)
 \end{aligned}$$

2: $f(t) = 1 + \sin(t + \pi/2)$

3: Subtract 1 from (1)