Fourier Series Expansion of a Square Wave

Please submit your homework to mustafa.mulla@emu.edu.tr in a Microsoft Word document before 4 pm on 30th April 2018.

Consider a square wave $f(x)$ of length $2L$ over the range $[0, 2L]$ as shown in Figure 1. Formally $f(x)$ can be written as

$$f(x) = 2[H(x/L) - H(x/L - 1)] - 1 \quad (1)$$

where $H(x)$ is the Heaviside step function. Since $f(x) = f(2L - x)$, the function is odd, such that $a_0 = a_n = 0$. Find the Fourier series expansion $b[n]$ of the square wave given in Figure 1 and plot the summation of the first 7 (odd) terms of the series from *n* = 1 to *n* =13. Please provide the MATLAB code and plot along with your solution.