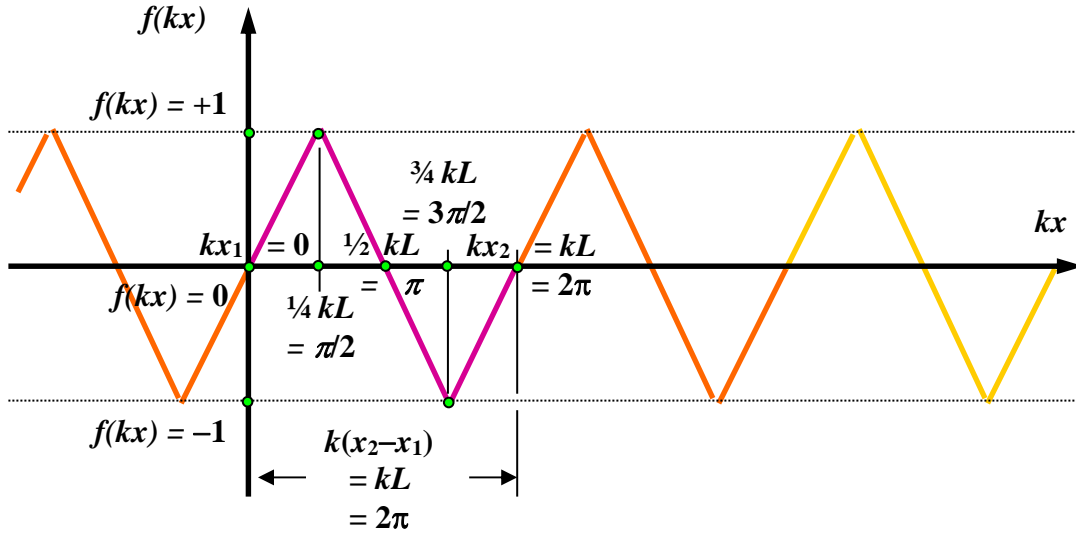


## Fourier Analysis III:

### More Examples of the Use of Fourier Analysis

#### D. Fourier Analysis of a Periodic, Symmetrical Triangle Wave

We now consider a *spatially*-periodic, symmetrical, bipolar triangle wave of unit amplitude, as shown in the figure below:



Mathematically, this *odd*-symmetry waveform, on the “generic” interval  $0 \leq \theta < 2\pi$  (i.e. one cycle of this waveform) is described as:

$$f(\theta) = f(kx) = +(2/\pi)\theta \quad \text{for} \quad 0 \leq \theta < \pi/2$$

and:

$$f(\theta) = f(kx) = -(2/\pi)\theta + 2 \quad \text{for} \quad \pi/2 \leq \theta < 3\pi/2$$

and:

$$f(\theta) = f(kx) = +(2/\pi)\theta - 4 \quad \text{for} \quad 3\pi/2 \leq \theta < 2\pi$$

Where we used the straight line equation,  $y = mx + b$  to determine the slopes,  $m$  and the intercepts,  $b$  associated with each of the three line segments in the above waveform on this  $\theta$ -interval.