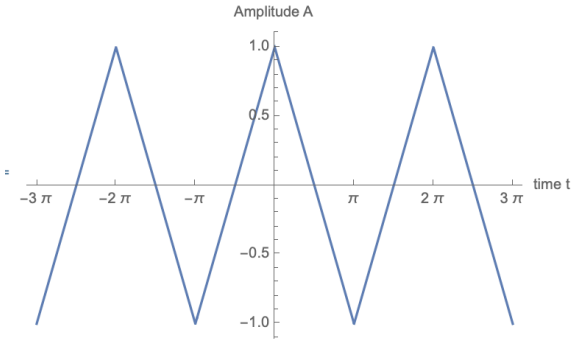

1 Fourier Series of a Triangle Wave

Consider the following triangle wave:

(a) Find the Fourier series for a triangle wave (such as the one shown in the figure), which has amplitude A and period T.

(b) Plot two approximations to your solution, one including the first nonzero term and the other including the first four nonzero terms.

(c) Make a histogram of your coefficients, i.e. find the spectrum.

2 Homogeneous Linear ODE's with Constant Coefficients

Homogeneous, linear ODEs with constant coefficients were likely covered in your Differential Equations course (MTH 256 or equiv.). If you need a review, please see:

Constant Coefficients, Homogeneous

or your differential equations text.

Answer the following questions for each differential equation below:

- identify the order of the equation,
- find the number of linearly independent solutions,
- find an appropriate set of linearly independent solutions, and
- find the general solution.

Each equation has different notations so that you can become familiar with some common notations.

(a) $\ddot{x} - \dot{x} - 6x = 0$

(b) $y''' - 3y'' + 3y' - y = 0$

(c) $\frac{d^2w}{dz^2} - 4\frac{dw}{dz} + 5w = 0$