1 Assignment 4 Fourier Series; Approximation of Functions

To construct the trigonometric polynomial of order M of the form

$$T_M(x) = \frac{A_0}{2} + \sum_{j=1}^{M}[A_j cos(jx) + B_j sin(jx)]$$

based on the N equally spaced values $x_k = -\pi + 2\pi k/N$,for $k = 1, 2, \ldots, N$. The construction is possible provided that $2M + 1 \leq N$. You are given the program that constructs vectors A and B that contain the coefficients A_j and B_j, respectively, of the equation above of order M.

- Modify this program so that it will find the trigonometric polynomial of period $2P = d - c$ when data points are equally spaced over the interval $[c, d]$.
- Use your modified program to find $T_5(x)$ for

  $$f(x) = -x^2 + 9 \ for \ -3 \leq x < 3$$

  using 60 equally spaced data points.
- Graph $T_5(x)$ and the data points on the same coordinate system.