1 Assignment 4 - Approximation of Functions; Due to January 10, 2010

1. To construct the trigonometric polynomial of order M of the form

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

based on the N equally spaced values

$$x_k = -\pi + 2\pi \frac{k}{N}, \ for \ k = 1, 2, \ldots, N$$

   (a) Find the Fourier coefficients for $f(x) = x/2$ on $-\pi$ to π by hand. Do not evaluate the integrals. Expand the series until third term.

   (b) Write a ***one complete program***;

   - Use the 30 equally spaced points ($k = 1, 2, \ldots, 30$).
   - Find the trigonometric polynomial approximation of $f(x) = x/2$ for $M = 14$ to the 30 data points.
   - Also compare the results when 60 and 360 points are used.
   - Also compare the results when $M = 29$ and $M = 179$.
   - You should have three figures (each having 3 subplots);
     i. For $M = 14$, at 30, 60, 360 points
     ii. For $M = 29$, at 30, 60, 360 points
     iii. For $M = 179$, at 30, 60, 360 points
   - You can make use of code segments (not as a full program/function) of previous lab studies.