Engineering Mathematics   Hw#3   2B

23 March 2005

1) Let $f(x) = x\sin(x)$ for $-\pi \le x \le \pi$ (Section 13.5 Problems)

   (a) Write the Fourier series for $f(x)$ on $[-\pi,\ \pi]$

   (b) Show that this series can be differentiated term-by-term and use this fact to
       obtain the Fourier expansion of $\sin(x) + x\cos(x)$ on $[-\pi,\ \pi]$

   (c) Write the Fourier series of $\sin(x) + x\cos(x)$ on $[-\pi,\ \pi]$ by computation of
       the Fourier coefficients and compare the result with that of (b)

2) Let $f(x) = x$ for $0 \le x < 2$ and $f(x+2) = f(x)$ for all x (Section 13.6 Problem 5.)

   Find the phase angle form of the Fourier series of the function. Plot some points of
       the amplitude spectrum of the function. (hint: please refer to Example 13.28)

3) Let f has period 3 and $f(x) = 2x$ for $0 \le x < 3$ (Section 13.7 Problem 1.)

   (a) Write the complex Fourier series of f

   (b) Determine what this series converges to

   (c) Plot some points of the frequency spectrum
       (hint: please refer to Example 13.29)