Reading: O&W-3.3, 3.4, 3.5, 3.8 (continuous time signals only)

S2) The signal x(t) is periodic, with period 2, and

$$x(t) = \begin{cases} t+1 & -1 < t < 0 \\ 1-t & 0 < t < +1 \end{cases}$$

Determine the Fourier series for x(t).

[Hint: Make use of the properties of Fourier series to simplify this problem]

S3) If x(t) is a periodic signal with the following Fourier series coefficients

$$a_k = \begin{cases} 1 & k = 0 \\ j\left(\dfrac{1}{2}\right)^{|k|} & otherwise \end{cases}$$

(i)   Is x(t) a real valued function of time?

(ii)   Is x(t) an even function of time?

(iii)   Is dx(t)/dt an even function of time?

S4) For the following signals

$$x(t) = \cos(\pi t)$$
$$y(t) = \sin(\pi t)$$
$$z(t) = x(t)y(t)$$

and with a fundamental period of T=2,

i) Determine the Fourier series coefficients for x(t) and y(t).

ii) Use the results of part (i), along with the multiplication property of Fourier series, to determine the Fourier series for z(t).

[Hint: part (ii) can be greatly simplified by using the fact that there are only a few non-zero coefficients in the Fourier series' for x(t) and y(t)]