

## ELEG 3124 Assignment # 6

1. For the periodic signal

$$x(t) = 2 + \frac{1}{3} \cos\left(t + \frac{\pi}{6}\right) + 2 \cos(3t) - 2 \sin\left(5t + \frac{\pi}{6}\right) \quad (1)$$

- (a) Find the Fourier series  
 (b) Use Matlab to sketch the magnitude and phase spectra as a function of the angular frequency  $\Omega$ .

2. Find the Fourier series representation of the signals shown in Fig. 1. Plot the magnitude and phase spectrum for each case.

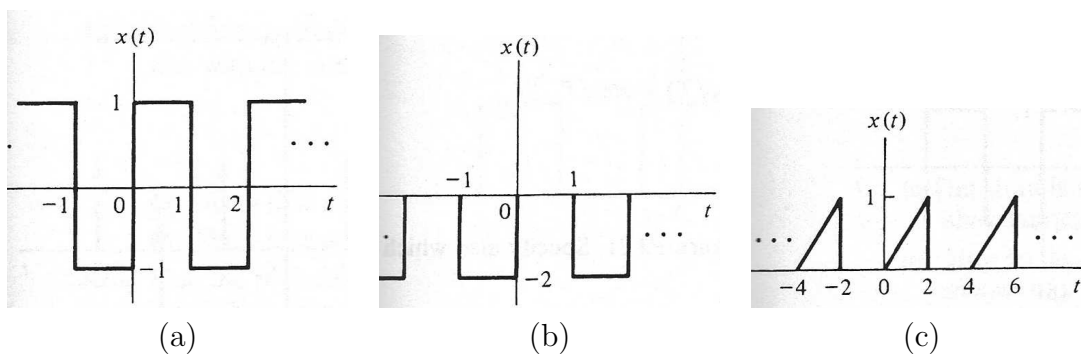


Figure 1: Question 2

3. The signal shown in Figure 2 (next page) is created with a sine voltage is rectified by a circuit with two diodes, a process known as full-wave rectification. Find the Fourier series of the signal. (Hint:  $x(t) = \sin(t), 0 < t < \pi$ .  $x(t)$  can be expressed as complex exponentials with Euler's formula).

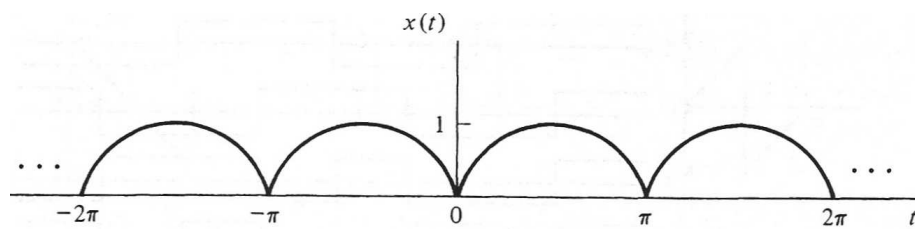


Figure 2: Question 3