

XMUT310 Communications Engineering

Homework 1 (35 marks)

Attempt all 7 questions on your own. Each question is worth 5 marks.

You must show mathematical proof as part of your answers.

Q1. Determine whether this signal is periodic or non-periodic?

$$X(t) = \sin 2000\pi t + \sin 5500 \pi t$$

Q2. Is this signal an odd signal?

$$x_1(t) = \begin{cases} e^{-t} & t > 0 \\ -e^t & t < 0 \\ 0 & t = 0 \end{cases}$$

Q3. Is this signal even or odd?

$$x_3(t) = e^{-|t|}$$

Q4. Is this signal a power or energy signal?

$$x(t) = Ae^{j(2\pi f_0 t + \theta)}$$

Q5. Is this a linear system?

$$y(t) = 2x(t) - 3$$

Q6. Is this a linear system?

$$y(t) = |x(t)|$$

Q7. The Fourier transform of a signal is shown in Figure below. Determine and sketch the Fourier transform of the signal:

$$x_1(t) = -x(t) + x(t) \cos(2000\pi t) + x(t) (1 + \cos(6000\pi t))$$

