RC2017 Signals and Systems **Homework 10**
Assign: Thu 25 April 2019 **Due for RC2: 1 May 2019**

Instruction: Hand in your work with name and code to my desk by 10.00 am. of the due date. DO NOT copy homework from your classmates or lend it to others. Anyone who violates this regulation will be given -10 for the homework.

1. Compute the Fourier transform of each of the following siganals:

   (a) $[e^{-\alpha t}\cos\omega_0 t]u(t),\ \alpha > 0$

   (b) $e^{-3|t|}\sin 2t$

   (c) $x(t) = \begin{cases} 1+\cos\pi t, & |t| \le 1 \\ 0, & |t| > 1 \end{cases}$

   (d) $\sum_{k=0}^{\infty} \alpha^k \delta(t-kT),\ |\alpha| < 1$

   (e) $[te^{-2t}\sin 4t]u(t)$

   (f) $\left[\frac{\sin \pi t}{\pi t}\right]\left[\frac{\sin 2\pi(t-1)}{\pi(t-1)}\right]$

   (g) $x(t)$ as shown in Figure 1 .

   (h) $x(t)$ as shown in Figure 2 .

   (i) $x(t) = \begin{cases} 1-t^2, & 0 < t < 1 \\ 0, & \text{otherwise} \end{cases}$

   (j) $\sum_{n=-\infty}^{\infty} e^{-|t-2n|}$

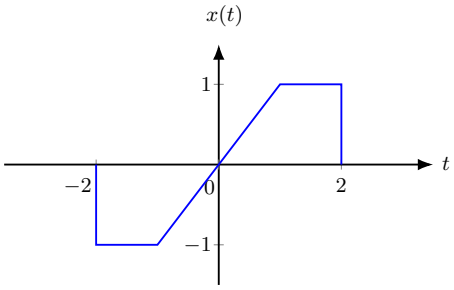


Figure 1: Question 1g

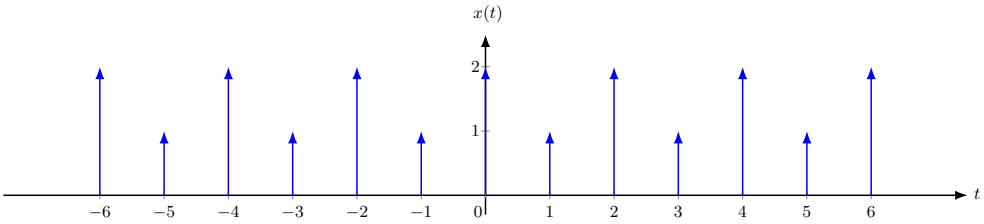


Figure 2: Question 1h

2. Determine the continuous-time signal $x(t)$ corresponding to each of the following Fourier transforms

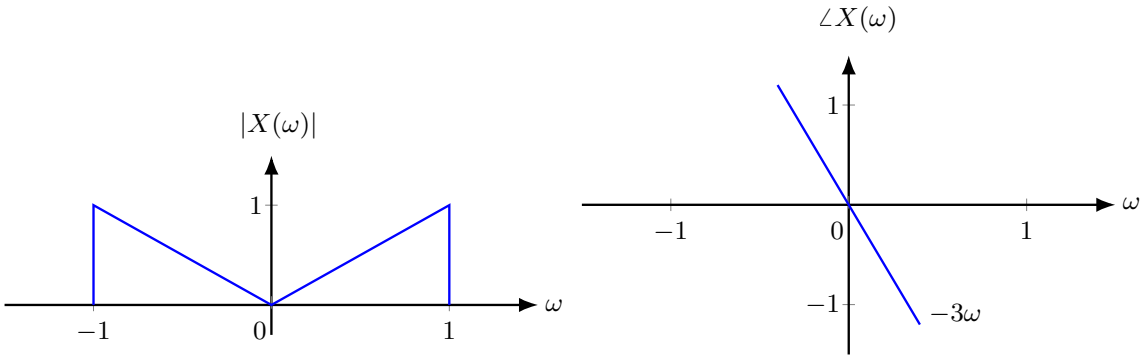
   (a) $X(\omega) = \dfrac{2\sin[3(\omega - 2\pi)]}{(\omega - 2\pi)}$

   (b) $X(\omega) = \cos(4\omega + \pi/3)$

   (c) $X(\omega)$ as given by the magnitude and phase plots of Figure 3.

   (d) $X(\omega) = 2[\delta(\omega - 1) - \delta(\omega + 1)] + 3[\delta(\omega - 2\pi) + \delta(\omega + 2\pi)]$

   (e) $X(\omega)$ as in Figure 4.



(a)

Figure 3: Question 2c

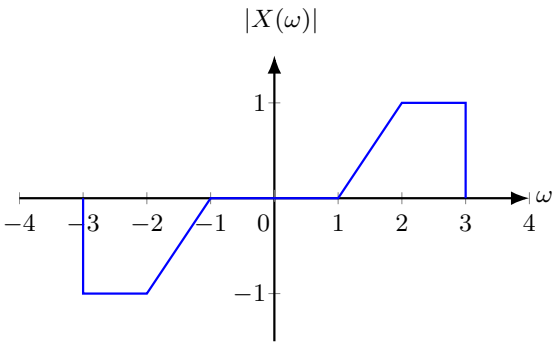


Figure 4: Question 2e