CITY UNIVERSITY OF HONG KONG
Department of Electronic Engineering

EE 3210 Signals and Systems

Homework #7

1. Use the table and properties of Fourier transform to find the transform for the following signals:
   (a) (Note that in Assignment #6, you were asked to find the transform of $te^{-2t}\sin 4tu(t)$)

$$x(t) = \frac{d}{dt}\left[te^{-2t}\sin 4tu(t)\right]$$

   (b)

$$x(t) = \left[\frac{2\sin 3\pi t}{\pi t}\right]\left[\frac{\sin 2\pi t}{\pi t}\right]$$

   (c)

$$x(t) = \int_{-\infty}^{t} \frac{\sin 2\pi\tau}{\pi\tau} d\tau$$

2. Problem 4.32, (a), (b), (c), pp. 345.

3. Problem 4.33 (a), (b), pp. 345.

4. Problem 4.36, pp. 346.

5. Consider an LTI system with frequency response

$$H(j\omega) = \frac{j\omega + 1}{(j\omega)^2 + 8j\omega + 15}.$$

   (i) Find the impulse response of this system.
   (ii) Determine a differential equation that describes the system.
   (iii) Find a block diagram realization consisting of adders, integrators, and coefficient multipliers for this system.
   (iv) Suppose that an input signal $x(t) = e^{-2t}u(t)$ is applied. Determine the output response.