EE 470 – Extra Practice Problem Set #2

1. Evaluate the frequency-domain representations of the shown signals:



- 2. Use the Fourier transform tables and properties to obtain the Fourier transform of the following signals:
- (a) $x(t) = \sin(2\pi t)e^{-t}u(t)$
- (b) $x(t) = te^{-3|t-1|}$
- (c) $x(t) = \left[\frac{2\sin(3\pi t)}{\pi t}\right] \left[\frac{\sin(2\pi t)}{\pi t}\right]$

(d)
$$x(t) = \frac{d}{dt}(te^{-2t}\sin(t)u(t))$$

- (e) $x(t) = \int_{-\infty}^{t} \frac{\sin(2\pi\tau)}{\pi\tau} d\tau$
- (f) $\mathbf{x}(t) = e^{-t+2}\mathbf{u}(t-2)$ (g) $\mathbf{x}(t) = \left(\frac{\sin(t)}{\pi t}\right) * \frac{d}{dt} \left[\left(\frac{\sin(2t)}{\pi t}\right) \right]$
- 3. Replace the time variable "t" with the frequency variable " Ω " in all signals in problems 4, 5 and 6 and repeat to obtain the inverse Fourier transform of these signals.
- 4. Determine whether the following signal has finite or infinite energy:

$$x(t) = \frac{e^{-2jt}\sin(100t)}{5t}u(t)$$

5. Determine the step response of the system described by the following differential equation: y''(t) + y'(t) - 2y(t) = 2x'(t) + x(t), with y(0) = 0, y'(0) = 0, x(0) = 1