EE 2000 Assignment # 9

(taken from Dr. Jingxian Wu, University of Arkansas, 2020.)

1. Let $X(\omega) = \frac{1}{2+j\omega}$. Find the Fourier transform of the following functions by using the properties of the Fourier transform
   (a) $tx(t)$
   (b) $x\left(\frac{t}{2} - 1\right)$
   (c) $t\frac{dx(t)}{dt}$
   (d) $(t-1)x(t+1)$
   (e) $x(2t-1)\exp(-j2t)$
   (f) $x(t)\cos(\omega_0 t)$
2. Use the properties of Fourier transform, find the Fourier transform of the following signals.
   (a) $\text{sinc}(t)$
   (b) $\exp(j\omega_0 t)$
   (c) $\sin(\omega_0 t)$
3. The impulse response of an LTI system is $\exp(-t)u(t)$. If the input is $\exp(-2t)u(t)$, find the output of the system by using Fourier transform.
4. Using Parseval's theorem, find the energy of the signal $\text{sinc}(t)$.