Full Name: _____

EEE 5502 – Practice **Continuous-Time Fourier Transforms**

Question #1: Determine the continuous-time Fourier transform (CTFT) or inverse CTFT for the following equations. Use the continuous-time transform tables on the course website.

(a) $x(t) = u(t+2) - u(t-2)$

Solution:

$$X(\Omega) = 4\,\mathrm{sinc}(2\Omega)$$

(b) $x(t) = u(t) - u(t-4)$

Solution:

$$X(\Omega) = 4\,\mathrm{sinc}(2\Omega)e^{-j\Omega 2}$$

(c) $x(t) = e^{-t}u(t-1) * e^{-2t}u(t)$

Solution:

$$\begin{aligned} x(t) &= e^{-(t-1)-1}u(t-1) * e^{-2t}u(t) \\ &= e^{-1}e^{-(t-1)}u(t-1) * e^{-2t}u(t) \\ X(\Omega) &= e^{-1}\left(\frac{e^{-j\Omega}}{1+j\Omega}\right)\left(\frac{1}{2+j\Omega}\right) \end{aligned}$$

(d) $X(\Omega) = j\pi\left[\delta(\Omega - \pi/3) - \delta(\Omega + \pi/3)\right]$

Solution:

$$x(t) = -\sin((\pi/3)t)$$