

Name \_\_\_\_\_

**EE-3221 – Dr. Durant – Quiz 3**  
**Winter 2020-'21, Week 3**

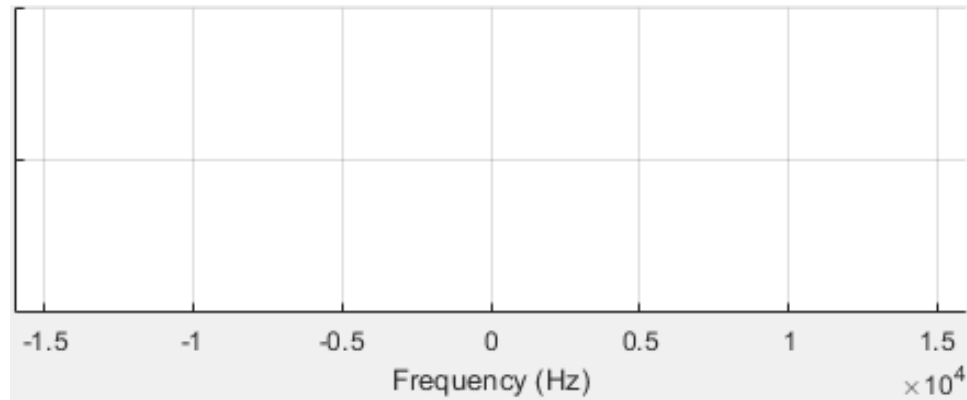
---

This is a **closed**-book quiz. But, as always, you may refer to your homework that is due today.

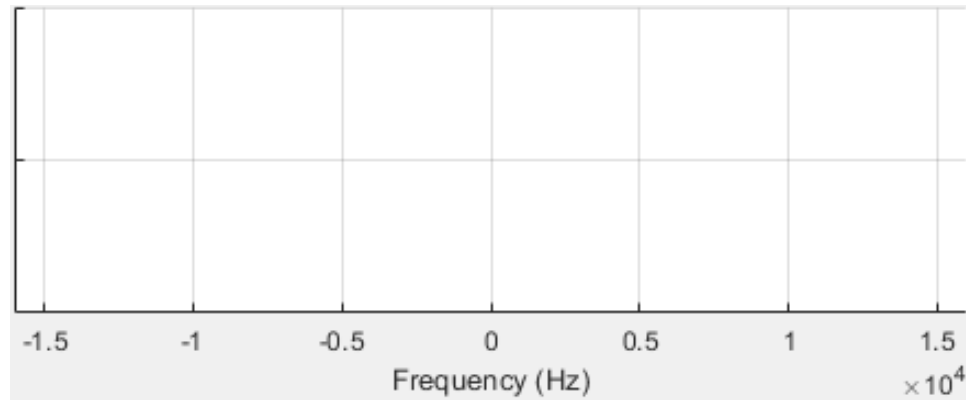
$$F\{\cos(\omega_0 t)\} = \pi((\delta(\omega - \omega_0) + \delta(\omega + \omega_0))) = (1/2) ((\delta(f - f_0) + \delta(f + f_0)))$$

In the above FT pair, the change from rad/sec to hertz requires dividing Fourier Transform by  $2\pi$ .

1. (3 points) Let  $x(t) = 3 \cos(2\pi \times 2500t) + 7 \cos(2\pi \times 5500t)$ . Plot the magnitude spectrum  $|X(f)|$ . Note the multiplier of  $10^4 = 10,000$  on the frequency axis.



2. (4 points) Let  $x(t)$  be sampled at sampling frequency  $f_s = 10$  kHz with no anti-alias (lowpass) filter applied. Plot the magnitude spectrum  $|X_s(f)|$  of the sampled signal to  $f = \pm 16$  kHz. Recall that sampling creates images of the original spectrum centered at  $nf_s$  for  $n = \dots, -2, -1, 0, 1, 2, \dots$



3. (3 points) Discuss whether aliasing occurs and, what, if any, aliased frequency(ies) appear.