

ECE 321 - Homework #2

Active Filters. Poles, Zeros, Frequency Response. Due Monday, November 13th, 2017

1) For the following filter

$$Y = \left(\frac{100}{(s+5)(s+10)} \right) X$$

- What is the differential equation relating X and Y?
- Determine $y(t)$ assuming

$$x(t) = 2 + 3 \sin(5t) + 4 \sin(100t)$$

- Plot the gain vs. frequency for this filter from 0 to 20 rad/sec
- Design a circuit to implement this filter.

2) For the following filter:

$$Y = \left(\frac{200}{s^2+4s+25} \right) X$$

- What is the differential equation relating X and Y?
- Determine $y(t)$ assuming

$$x(t) = 2 + 3 \sin(5t) + 4 \sin(100t)$$

- Plot the gain vs. frequency for this filter from 0 to 20 rad/sec
- Design a circuit to implement this filter.

3) For the following filter:

$$Y = \left(\frac{2s}{s^2+2s+25} \right) X$$

- What is the differential equation relating X and Y?
- Determine $y(t)$ assuming

$$x(t) = 2 + 3 \sin(5t) + 4 \sin(100t)$$

- Plot the gain vs. frequency for this filter from 0 to 20 rad/sec
- Design a circuit to implement this filter.