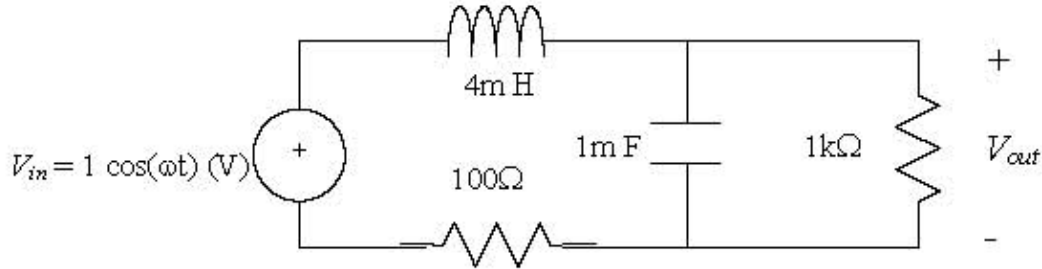


**EEE 202, TEST 5**

**NAME: SOLUTIONS**

Closed-book/notes, 2problems, equal credit, 1 sheet of formulae allowed

**Problem 1:** For the following circuit

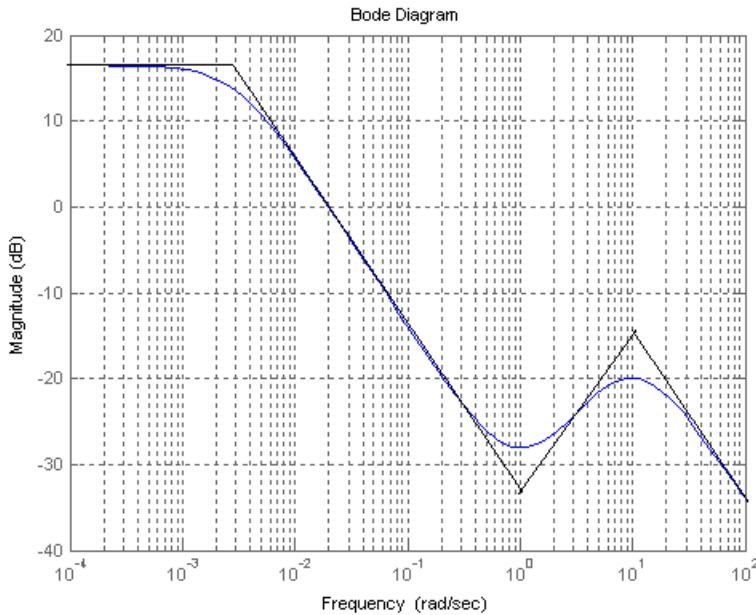


Find:

The transfer function 
$$\frac{V_{out}}{V_{in}} = \frac{\frac{1}{R+sC}}{\frac{1}{R+sC} + Ls + R_2} = \frac{\frac{R}{1+RCs}}{\frac{R}{RCs+1} + Ls + R_2} = \frac{R}{LCRs^2 + (L+R_2RC)s + (R+R_2)} = \frac{2.5e5}{s^2 + 0.25e5s + 2.75e5}$$

- The resonant frequency  $\omega_0 = \sqrt{\frac{R+R_2}{LCR}} = 524.4$
- The damping ratio  $\zeta = \frac{(L+R_2RC)}{LCR} \cdot \frac{1}{2\omega_0} = 23.84$

**Problem 2:** Find the transfer function  $H(j\omega)$  from its magnitude characteristic shown below.



Poles: 0.003, 10, 10  
 Zeros: 1, 1  
 DC gain = 16dB = 6.3

$$H(s) = \frac{6.3(s+1)^2}{\left(\frac{1}{0.003}s+1\right)\left(\frac{1}{10}s+1\right)^2}$$