

QUIZ NO. 2

(Average = 5.7/10 of those taking the quiz)

Sketch the asymptotic magnitude and asymptotic phase plot of the transfer function given below on the frequency plots given.

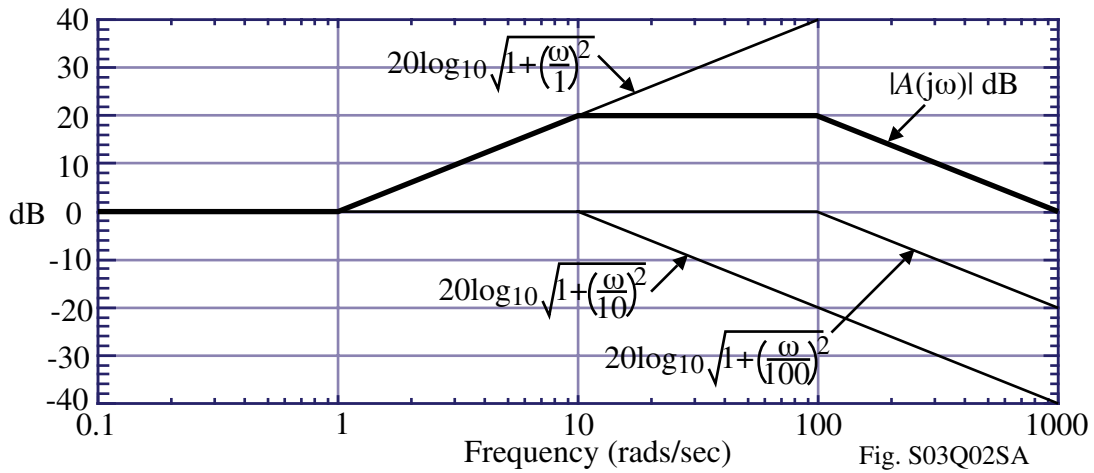
$$A(s) = \frac{-1000(s+1)}{(s+10)(s+100)}$$

Solution

$$A(j\omega) = \frac{-1000(1+j\omega)}{(10+j\omega)(100+j\omega)} \rightarrow A(j\omega) = \frac{-(1+j\omega)}{\left(1+\frac{j\omega}{10}\right)\left(1+\frac{j\omega}{100}\right)}$$

Magnitude:

$$|A(j\omega)|_{dB} = 20\log_{10}\sqrt{1+\omega^2} - 20\log_{10}\sqrt{1+\left(\frac{\omega}{10}\right)^2} - 20\log_{10}\sqrt{1+\left(\frac{\omega}{100}\right)^2}$$



Phase:

$$\text{Arg}[A(j\omega)] = \pm 180^\circ + \tan^{-1}\left(\frac{\omega}{1}\right) - \tan^{-1}\left(\frac{\omega}{10}\right) - \tan^{-1}\left(\frac{\omega}{100}\right)$$

