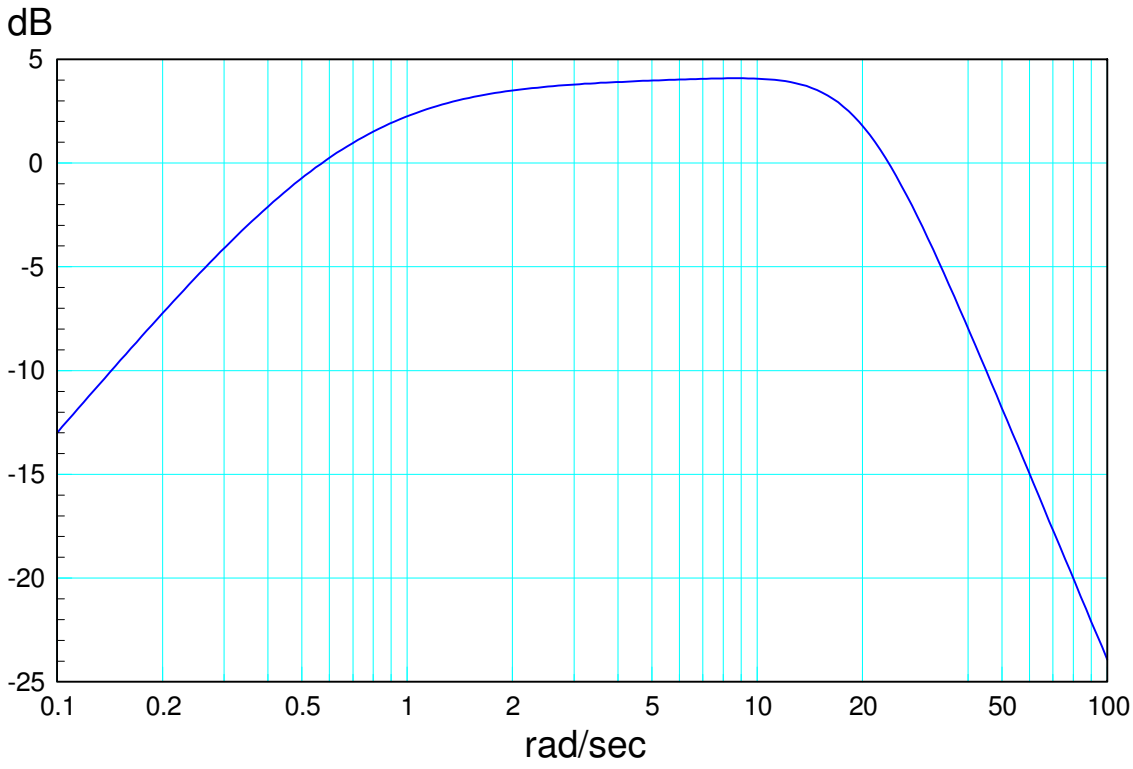
ECE 461/661 Handout #35

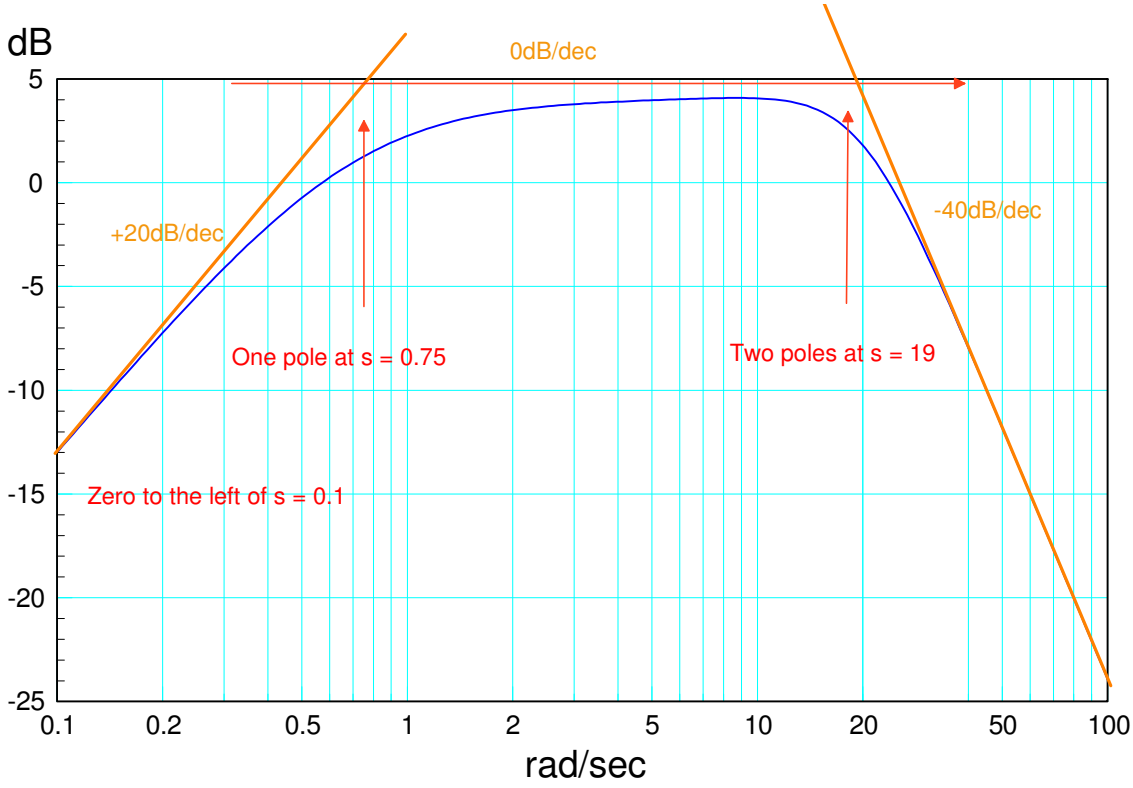
Bode Plots

Determine G(s) given the Bode plot



Solution

Draw in the straight-line asymptotes. Make sure each is at a multiple of 20dB/decade



The two poles at s = 19 could be complex. The angle is from the gain at the corner

$$\frac{1}{2\zeta} = -2dB = 0.7943$$

$$\zeta = 0.628$$

$$\theta = \arccos(\zeta) = 51^0$$

so

$$G(s) \approx \left(\frac{ks}{(s+0.75)\left(s+19\angle\pm 51^0\right)} \right)$$

Match the gain at a point.

$$G(j5) = 4dB = 1.585$$

$$\left(\frac{ks}{(s+0.75)\left(s+19\angle\pm 51^0\right)} \right)_{s=j5} = 1.585 \quad \Rightarrow \quad k = 570.2$$

$$\boxed{G(s) \approx \left(\frac{570.2s}{(s+0.75)\left(s+19\angle\pm 51^0\right)} \right)}$$