Problem 1:

You are given the transfer function:

\[
G(s) = \frac{0.01s^2 + 1.01s + 1}{0.1s^3 + 1.12s^2 + 2.1s + 9}.
\]

1) Find an analytic solution for \(|G(i\omega)|\) and \(\angle G(i\omega)\).

2) Use Matlab or another software program to plot \(|G(i\omega)|_{\text{dB}}\) and \(\angle G(i\omega)\) as a function of frequency; use a log scale for the frequency axis. Note: You will want to use the Matlab function \(\text{atan2}\) instead of \(\text{atan}\) when plotting \(\angle G(i\omega)\); many other software packages have similar four quadrant inverse tangent functions.

3) Plot the bode plot of \(G(s)\) using \text{bode} in Matlab. You should get the exact same plot as Part 2.

Problem 2: You are given the bode plot in Fig. 1 and no other information about the system it represents. Approximate the transfer function, \(G(s)\), from the bode plot. Assume that, asymptotically, the plot maintains its form beyond the frequency range shown. Show the individual transfer function components you combined together to assemble the entire transfer function.
Fig. 1. Bode plot for Problem 2.