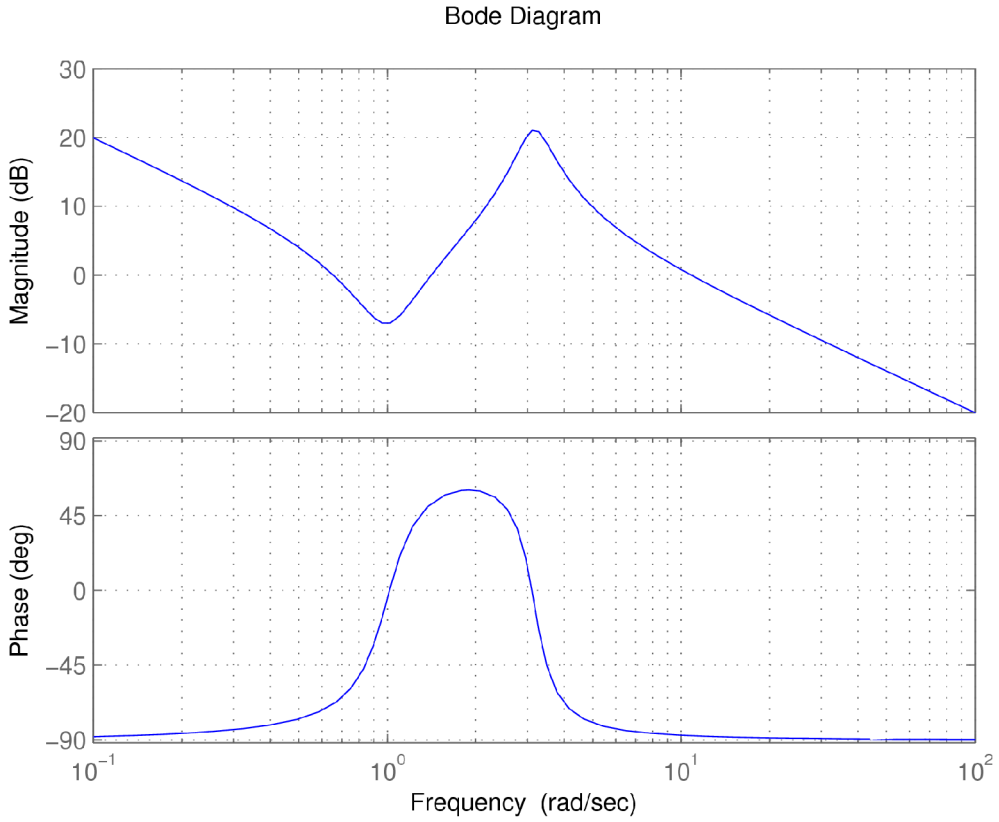
## 1 Recognize TF from bode diagram

**c**

The bode diagram of a linear system is given below




The transfer function which has this frequency response is:

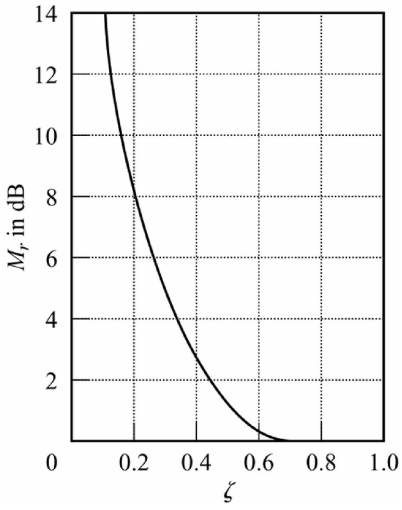
a) $G(s) = \dfrac{10(s^2 + 0.24s + 1)}{s(s^2 + 1.2s + 10)}$

b) $G(s) = \dfrac{10(s^2 + 1.2s + 1)}{s(s^2 + 2.4s + 10)}$

c) $G(s) = \dfrac{10(s^2 + 0.4s + 1)}{s(s^2 + 0.8s + 10)}$

d) $G(s) = \dfrac{(s^2 + 0.8s + 10)}{10s(s^2 + 0.4s + 1)}$

e) None of the above



## 2 Relative stability

Given is the below bode diagram.

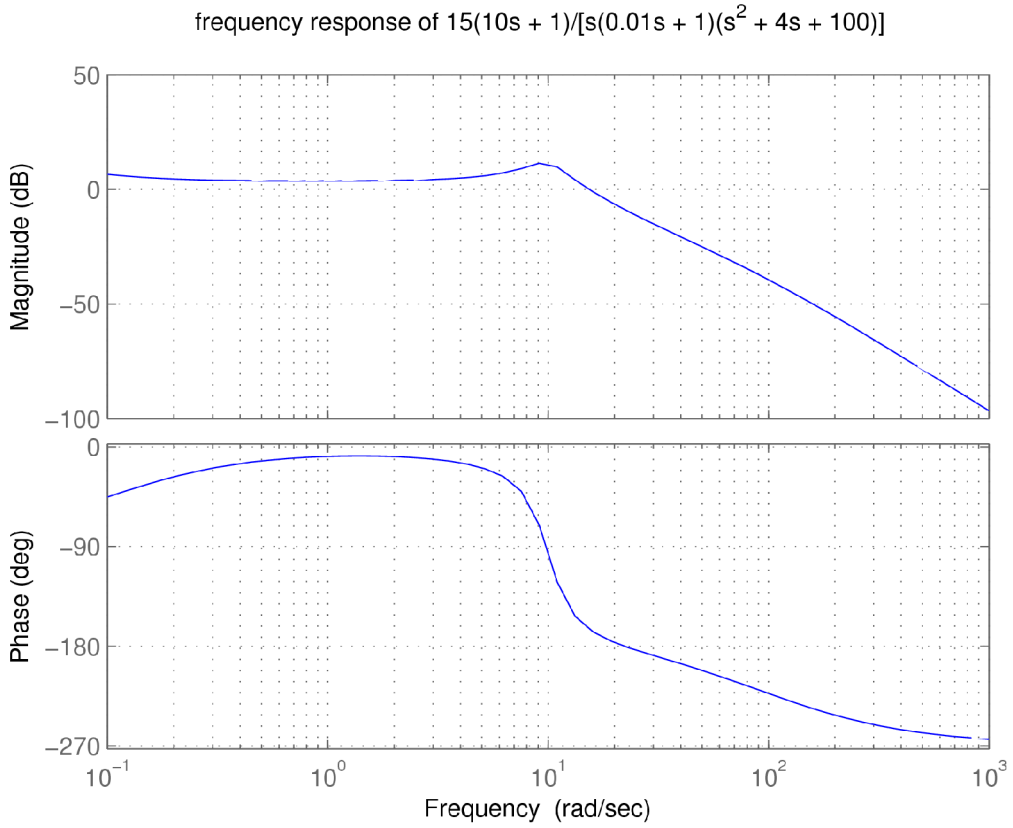



*Figure 1: Bode diagram of frequency response*

Determine phase margin $\gamma$ and gain margin $K_{\mathrm{g}}$.

a) $\gamma = 15^\circ,\ K_{\mathrm{g}} = 9\,\mathrm{dB}$

b) $\gamma = -15^\circ,\ K_{\mathrm{g}} = -9\,\mathrm{dB}$

c) $\gamma = 22.2\frac{\mathrm{rad}}{\mathrm{sec}},\ K_{\mathrm{g}} = 15.3\ \frac{\mathrm{rad}}{\mathrm{sec}}$

d) $\gamma = 15.3\frac{\mathrm{rad}}{\mathrm{sec}},\ K_{\mathrm{g}} = 22.2\ \frac{\mathrm{rad}}{\mathrm{sec}}$