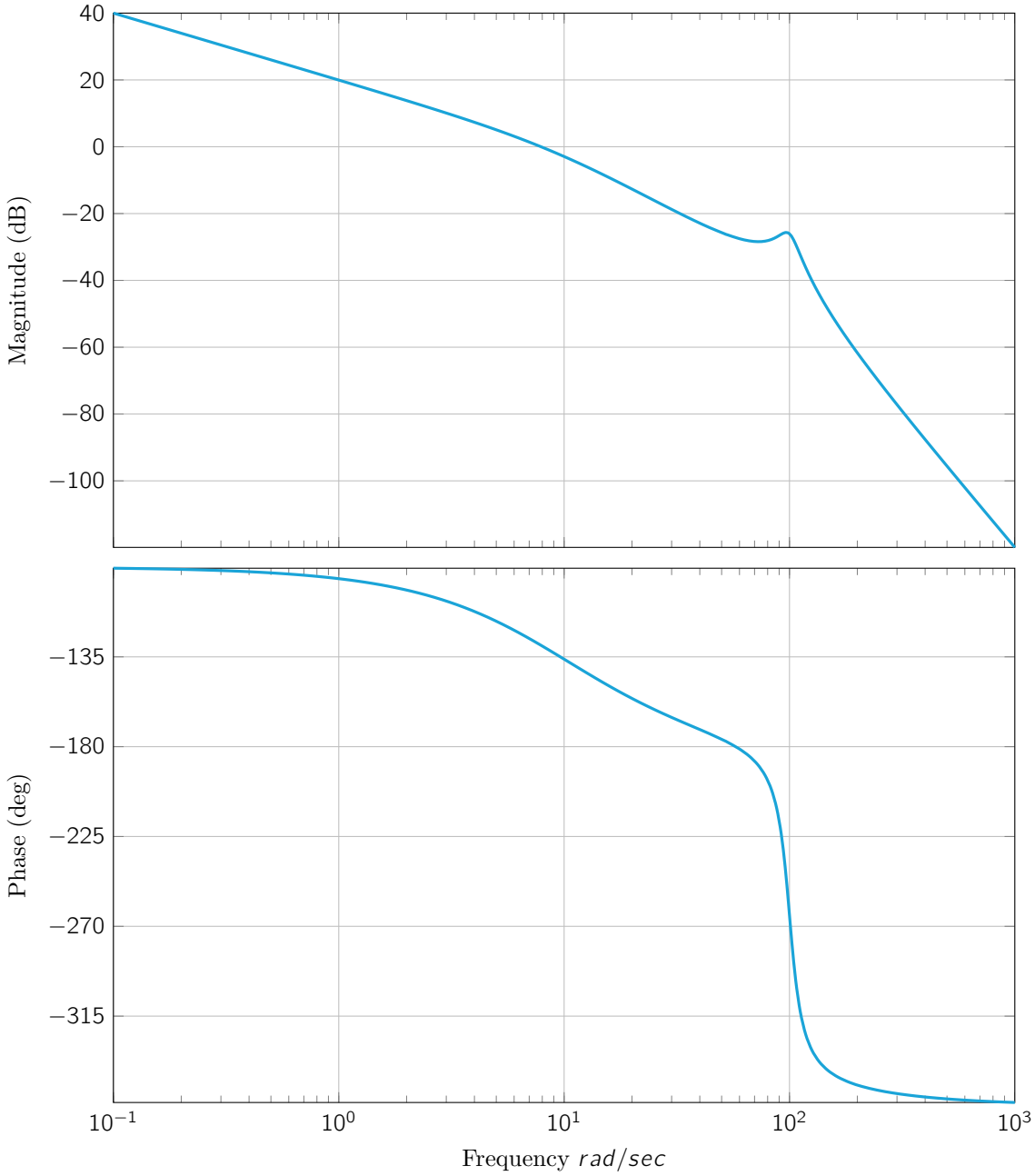
Control Systems : Set 5 : Loopshaping (1)

Prob 1 | Consider the Bode plot given below. Estimate a model for the system.



Matlab | There are several ways to enter transfer functions in Matlab - tf, zpk and ss. Use the help command in Matlab to see how they are used.
In addition, it is possible to enter transfer functions directly as a function of the Laplace variable

```
s = tf('s')
G = (s-3)/(s^2 + 3*s + 34)
```

You can then manipulate transfer functions algebraically, e.g., G1 * G2 + G3.

Computing standard closed-loop transfer functions can be done with the command feedback.

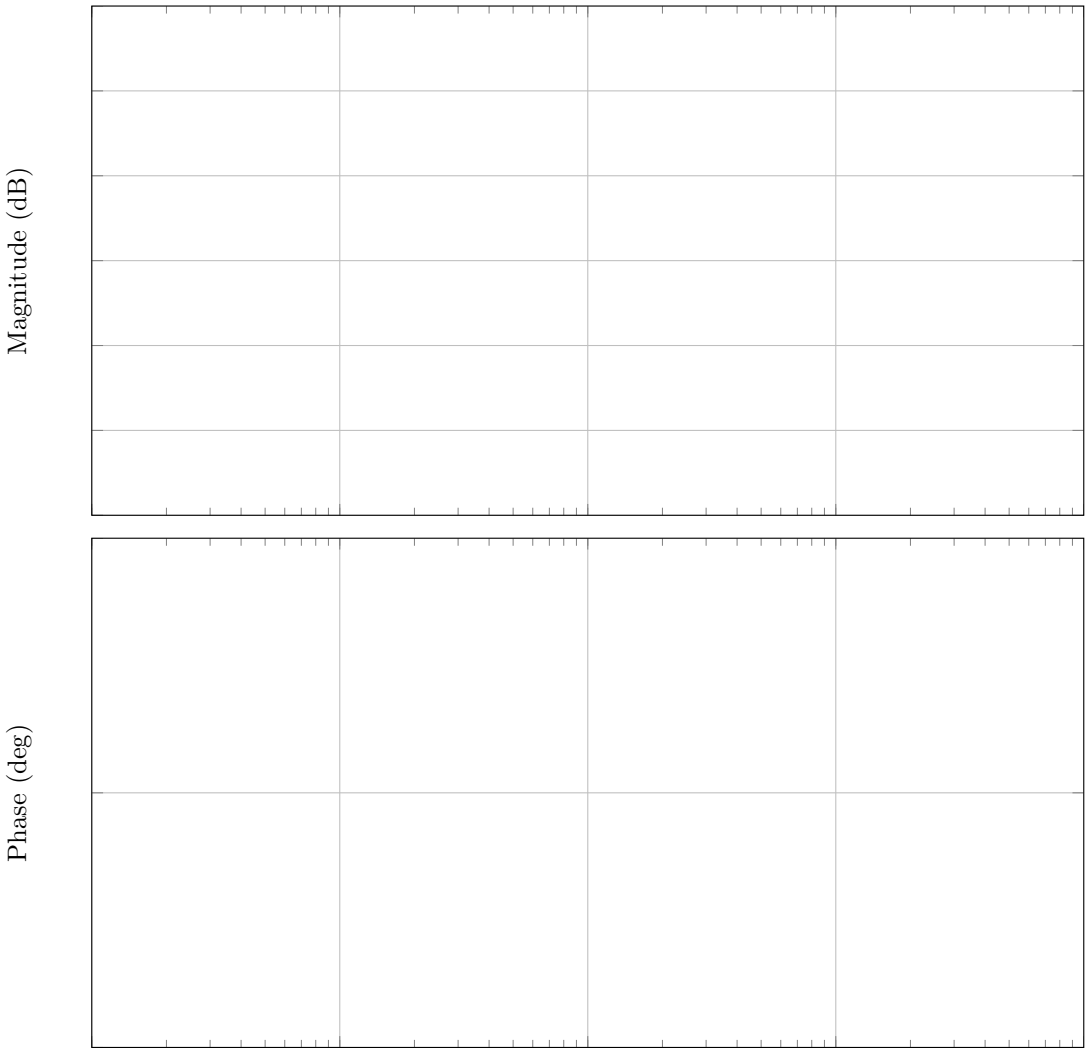
Some commands that you'll find useful

bode	Create Bode plot
nyquist	Create Nyquist plot
step	Compute unit step function.
	To compute the ramp response, just integrate the step input by multiplying by $1/s$ *step*(*G*) Step response *step*(*G*/*s*) Ramp response
impulse	Compute unit impulse function
lsim	Compute response to arbitrary input signal

Prob 2 | Sketch the bode plot for the system

$$G(s) = \frac{10}{s\,(s+10)}$$

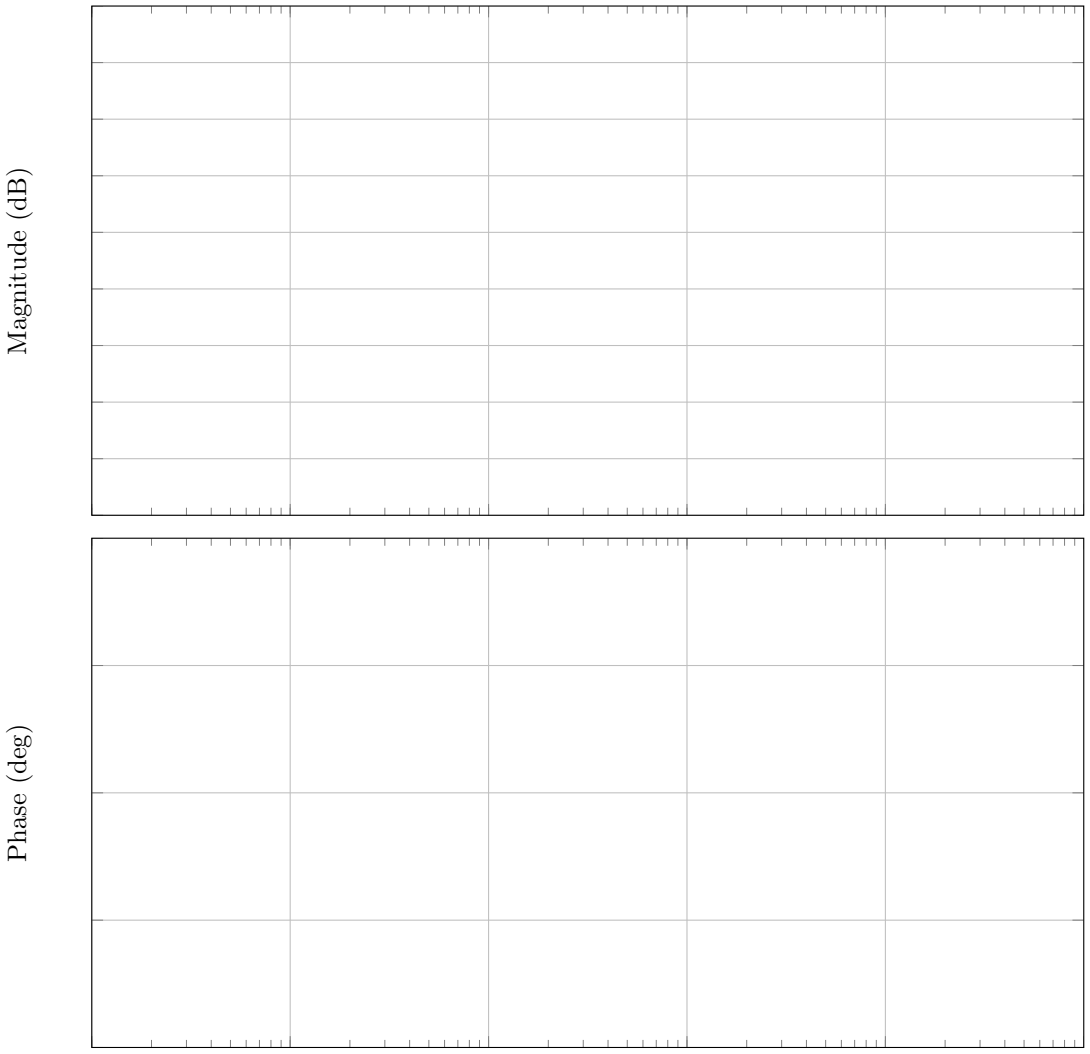
Check your answer using the Matlab command bode



Prob 3 | Sketch the bode plot for the system

$$G(s) = \frac{5}{s\,(s+2)\,(s+1)}$$

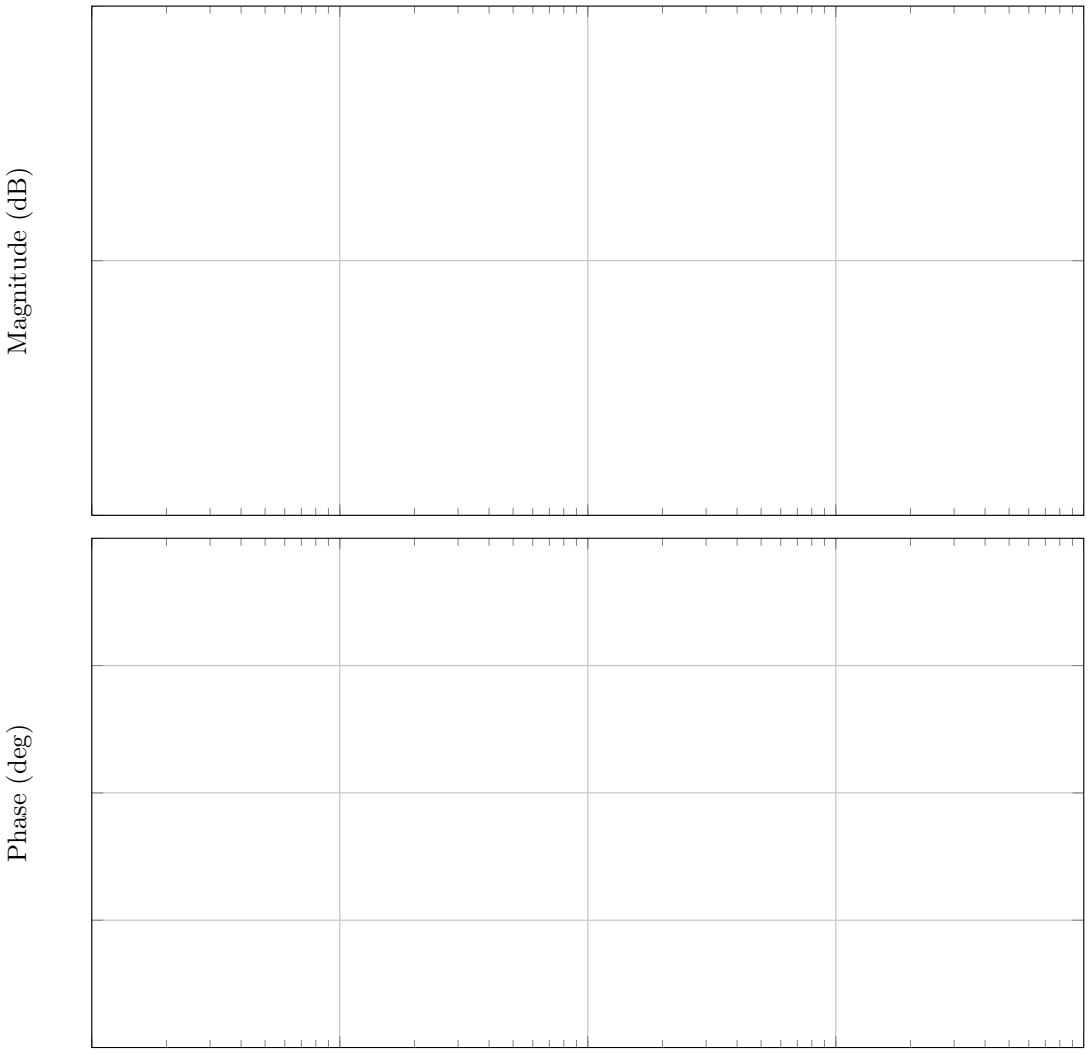
Check your answer using the Matlab command bode



Prob 4 | Sketch the bode plot for the system

$$G(s) = \frac{s}{s^2 + 2s + 5}$$

Check your answer using the Matlab command bode



Prob 5 | Sketch the bode plot for the system

$$G(s) = \frac{1}{(s-5)(s+2)}$$

Check your answer using the Matlab command bode