Consider the (broomstick) system $\dfrac{p^2}{s^2 - p^2}$ with $p = 6$ rad/s ($\approx$1 feet).

Hint: You might find it useful to read or watch Gunter Stein's Bode Lecture.

a) Find a stabilizing controller achieving

$$|T(i\omega)| < (\Omega_a/\omega)^2, \quad \text{when } \omega > \Omega_a = 10 \text{ rad/s}$$
$$M_s := \max_\omega |S(i\omega)| < 10$$

b) Try to get as low M_s you can, while maintaining the requirement on T.

Bonus: Try to find a theoretical lower bound on M_s (the requirement on T should of course hold).