Problem 4.8-2 in Lathi
Do parts a and c only.
Please reread Section 4.8-1 (pp. 429-430) in the book before answering this question.

Problem 4.9-1 in Lathi
Do part a only.

Problem 4.9-3 in Lathi

ECE-220 Problem 8
Sketch the Bode plot magnitude and phase for the following system

\[ H(s) = \frac{1}{s^2 + 14.14s + 100} \]

ECE-220 Problem 9
Consider the causal LTI system with transfer function \( H(s) \)

\[ H(s) = \frac{1}{s^2 + 510s + 5000} \]

(a) Determine a differential equation for this system.
(b) Sketch the pole-zero plot for this system.
(c) Sketch the frequency response of this system.
(d) Determine the output when the input is \( x_1(t) = e^{-2t}u(t) \).
(e) Determine the output when the input is \( x_1(t) = e^{-2t+100}u(t - 50) \).
(f) Determine the output of this system when the input is \( x(t) = \cos(3t) \) for all \( t \).
Consider the cascaded system shown below consisting of two causal LTI systems:

The first system has the impulse response given below:

\[ h_1(t) = 9.19e^{-4.2t}u(t) - 4e^{-2.5t}u(t) + e^{-t}\cos\left(3t + \frac{\pi}{4}\right)u(t) \]

The second system has the transfer function given below:

\[ H_2(s) = \frac{s}{(s + 52)(s + 2.95)(s^2 + 2s + 3)} \]

The input to the system is \( x(t) = u(t) \). What is the steady state output of this system? Please think carefully before doing any lengthy calculations.