1. Problems B-5-3, B-5-4, B-5-8 from the textbook.

2. Problem B-5-11 from the textbook. Use MATLAB to plot the step response of the system, and verify the performance specs with what you have derived. What is the steady-state error of the system?

Problem 3: Consider a system with the transfer function

\[ H(s) = \frac{s^2 + 5s + 24}{(s + 5)(s^2 + s + 4)}. \]  

(a) Plot the step response of the system by using Matlab. From the plot, estimate the parameters \( t_d, t_r, t_p, M_p \), and \( t_s \) (5\% criterion).

(b) Approximate \( H(s) \) by a second order transfer function \( H_{approx}(s) \) by simply discarding the term in the partial fraction expansion of \( H(s) \) corresponding to the pole at \( s = -5 \).

(c) Consider the step response of the system with transfer function \( H_{approx}(s) \). Find analytically the parameters \( t_d, t_r, t_p, M_p \), and \( t_s \) (5\% criterion) for this system, and compare the results with those in part (a). What conclusion can you draw from it?

(Hint: For Part (a) of the problem, you may either visually estimate the parameters from the plot directly, or use the procedure in p253 of the textbook. Keep in mind that the definition of these parameters are based on percentage values of the step response.)