Tutorial 8

19. Using the Routh-Hurwitz criterion, tell how many closed-loop poles of the system shown in Figure P6.5 lie in the left half-plane, in the right half-plane, and on the $j\omega$-axis. [Section: 6.3]

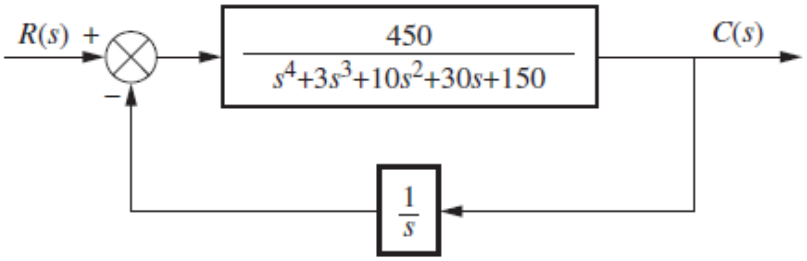

FIGURE P6.5

33. Given the unity feedback system of Figure P6.3 with

$$G(s) = \frac{K(s+4)}{s(s+1.2)(s+2)}$$

find the following: [Section: 6.4]

a. The range of K that keeps the system stable

b. The value of K that makes the system oscillate

c. The frequency of oscillation when K is set to the value that makes the system oscillate

52. The following system in state space represents the forward path of a unity feedback system. Use the Routh-Hurwitz criterion to determine if the closed-loop system is stable. [Section: 6.5]

State Space
SS

$$\dot{\mathbf{x}} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 2 \\ -5 & -4 & -3 \end{bmatrix} \mathbf{x} + \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix} \mathbf{x}$$