

University of Saskatchewan
 Department of Electrical Engineering
 EE 214- System Modeling and Network Analysis
 Mid-term Examination (This is a CLOSED Book Examination)

February 8, 2006

Duration: 90 minutes

1. Consider that a third-order control system has the characteristic equation

$$s^3 + 3408.3s^2 + 1204000s + 1.5 \times 10^7 K = 0$$

Use the Routh-Hurwitz criterion to determine the range of K for stability.

2. The circuit in Fig. 1 is a voltage-to-current converter. Find the current i_o if $V_I = 8 V$.

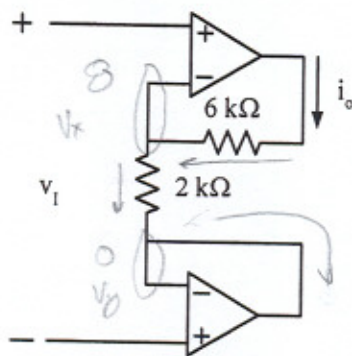


Fig. 1

3. Determine the required value of R so that $V_o = -1.95 V$ for the circuit of Fig. 2.

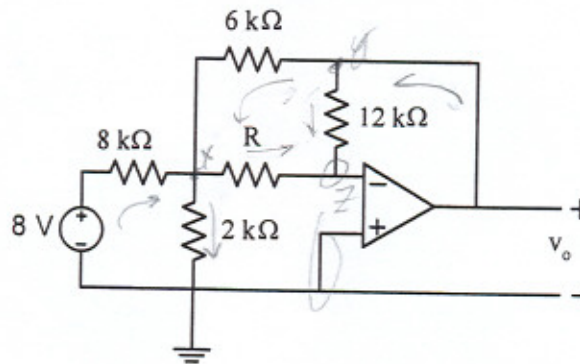


Fig. 2

4. Consider the circuit shown in Fig. 3.

Show that the transfer function can be expressed as:

$$G(s) = \frac{As}{s^2 + Bs + D}$$

Find A , B and D .

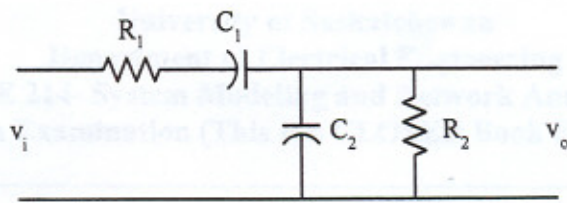


Fig. 3

Assume that a third-order control system has the characteristic equation

$$s^3 + 10s^2 + 17s + K = 0$$

Use the Routh-Hurwitz criterion to determine the range of K for stability.

The transfer function of a voltage divider circuit is given. Find the current i_1 if $V_1 = 8 \text{ V}$.



Fig. 1

1. Determine the required value of R so that $V_1 = -1.5 \text{ V}$ for the circuit in Fig. 1.



Fig. 2

1. Classify the circuit shown in Fig. 2.

Then find the transfer function that be expressed as

$$\frac{V_1}{V_2} = \frac{K}{s^2 + As + B}$$

Find A , B and D .