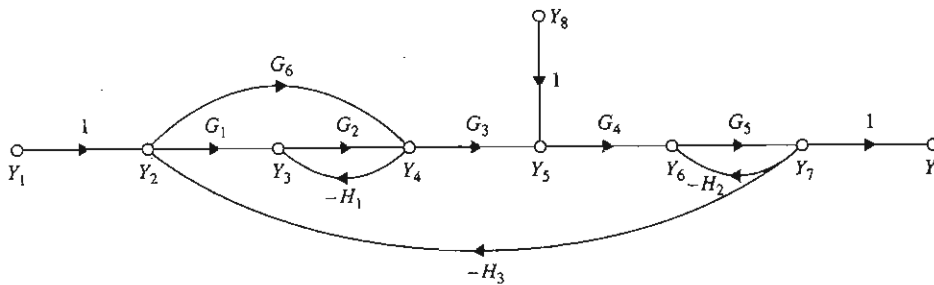


ECEN/MAE 3723 Systems I
Fall 2006
Quiz #4

November 28, 2006

Name: SOLUTION

Problem 1: Apply the gain formula to the SFG shown below to find the transfer functions of $\frac{Y_7}{Y_1}$.



Forward Paths:

$$M_1 = G_1 G_2 G_3 G_4 G_5, \quad \Delta_1 = 1$$

$$M_2 = G_6 G_3 G_4 G_5, \quad \Delta_2 = 1$$

Loop:

$$L_{11} = -G_2 H_1$$

$$L_{21} = -G_5 H_2$$

$$L_{31} = -G_1 G_2 G_3 G_4 G_5 H_3$$

$$L_{41} = -G_6 G_3 G_4 G_5 H_3$$

$$L_{12} = G_2 G_5 H_1 H_2$$

$$\frac{Y_7}{Y_1} = \frac{G_1 G_2 G_3 G_4 G_5 + G_3 G_4 G_5 G_6}{1 + G_2 H_1 + G_5 H_2 + G_1 G_2 G_3 G_4 G_5 H_3 + G_6 G_3 G_4 G_5 H_3 + G_2 G_5 H_1 H_2}$$