Eskişehir Osmangazi University - Electrical Engineering Department Fundamentals of Control Systems First Midterm Examination - Spring 2006



Figure 1: Block diagram referenced by Problems 1 and 2

1. For the block diagram of Figure 1, obtain the transfer function $\frac{C(s)}{R(s)}$.

2. For the block diagram of Figure 1, find the output c(t) when the input r(t) equals the unit step function.

3. Draw the canonical realization of the transfer function $\frac{1}{s^3+3s+8}$.



Figure 2: Block diagram referenced by Problem 4

4. For the block diagram of Figure 2, obtain the transfer function $\frac{C(s)}{R(s)}$. A. Karamancıoğlu

Solutions

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1. $\frac{\frac{2}{s+3}}{1+\frac{2}{s+3}3} = \frac{2}{s+9}$ 2. $\frac{2}{s+9}\frac{1}{s} = \frac{\frac{2}{9}}{s} + \frac{\frac{-2}{9}}{s+9} \leftrightarrow \frac{2}{9} - \frac{2}{9}e^{-9t}$



Figure 3: The canonical realization

4.
$$\frac{G_1G_2G_3 + G_1G_4(1 - G_2H_2)}{1 - (G_1G_2G_3H_1 + G_1G_4H_1 + G_2H_2) + G_1G_4H_1G_2H_2}$$