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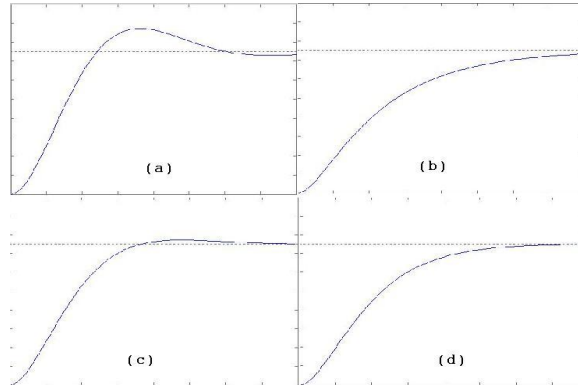

Figure 1: Graphics referenced by Problem 1

1. (no partial credits for this problem) Given that the unit step response graphics are drawn to the same scale, match them with the transfer functions given below:

1.1 $\dfrac{3}{s^2 + 2s + 4}$ **1.2** $\dfrac{3}{s^2 + 3s + 4}$ **1.3** $\dfrac{3}{s^2 + 4s + 4}$ **1.4** $\dfrac{3}{s^2 + 5s + 4}$

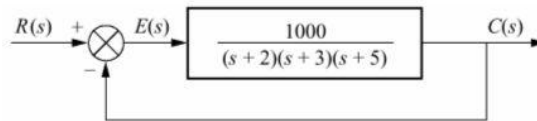**2.** Use Routh procedure to find out how many roots of the system in Figure 2

Figure 2: Configuration referenced by Problem 2

are in the RHP?

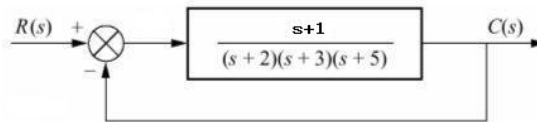**3.** Sketch the root loci for the configuration in Figure 3.

Figure 3: Configuration referenced by Problem 3

1. a,c,d,b

2.

$$T(s) = \frac{G(s)}{1 + G(s)} = \frac{1000}{s^3 + 10s^2 + 31s + 1030}$$

$$
\begin{array}{llc}
s^3 & 1 & 31 \\
s^2 & 10 & 1030 \\
s^1 & -72 & \\
s^0 & 1030 & \\
\end{array}
$$

Two sign changes in the first column. Two roots in the RHP.

3.

Root Locus