ECE 3510 homework # 10

b

1. The transfer functions of C(s) and P(s) are given below. In each case determine if the steady-state error will go to zero and whether disturbances will be completely rejected. Be sure to check for closed-loop stability when needed.

a) $C(s) = \frac{s+4}{s^2+3\cdot s+2}$ $P(s) = \frac{s+1}{s^2+3\cdot s}$ b) $C(s) = \frac{s+1}{s^2+3\cdot s}$ $P(s) = \frac{s+4}{s^2+3\cdot s+2}$

c) $C(s) = \frac{s\cdot(s+6)}{s^2+3\cdot s+2}$ $P(s) = \frac{s+8}{s^2+12\cdot s}$ d) $C(s) = \frac{s+9}{s^2+3\cdot s+2}$ $P(s) = \frac{s}{s+16}$

e) $C(s) = \frac{s+1}{s^2+5\cdot s+6}$ $P(s) = \frac{s+1}{s^2+8\cdot s+15}$ f) $C(s) = \frac{s+1}{s^3+7\cdot s^2+12\cdot s}$ $P(s) = \frac{s+1}{s+3}$

2. Problem 4.2 (p.98) in the text. Use the Routh-Hurwitz method.

3. Characteristic equations of feedback sytems are shown below. In each case, use the Routh-Hurwitz method to determine the value range of K that will produce a stable system.

a) $0 = s^4 + 20\cdot s^3 + 10\cdot s^2 + s + K$

b) $0 = s^4 + 2\cdot K\cdot s^3 + 5\cdot s^2 + K\cdot s + K$

Answers

1. a) Yes No b) Yes Yes

c) No No d) No Yes

e) No No f) Yes Yes

2. a) Yes b) No c) No

3. a) $0 < K < 0.4975$

b) $0 < K < 2.25$

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