

# ECE 141 Homework 4

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## Problem 4.11

(a)

The transfer function is

$$\frac{Y}{W} = \frac{1}{s^2 + K + D_c(s)}$$

Therefore from steady state theorem we have that the steady state error for a ramp input is

$$\lim_{s \rightarrow 0} s \frac{1}{s^2 + K + D_c(s)} \frac{1}{s^2} = \lim_{s \rightarrow 0} s \frac{1}{s^2 + Ks + D_c(s)s}$$

Therefore we have that in order to have constant steady state error,  $D_c(s)$  must have a pole at 0.

(b)

If  $D(s)$  has a pole at 0, we have that this is a type 1 system, therefore we can reject step input with 0 steady state error

## Problem 4.26