

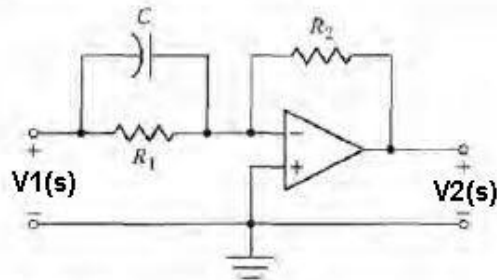
ELET3220 - Control Systems

Assignment 1

Due: October 31, 2020

1.

Obtain the transfer function of the differentiating circuit shown



[8]

2. The transfer function of a system is

$$\frac{Y(s)}{R(s)} = \frac{10(s+2)}{s^2+8s+15}$$

Determine $y(t)$ when $r(t)$ is a unit step input.

[5]

Find the steady state response

[2]

What damping does this system have ?

[1]

3. For the equation $Y(s) = \frac{(s+b)y_0}{s^2+bs+c}$,

where b and c are real constants of an underdamped system.

Make an s -plane plot of the poles and zeros of $Y(s)$

where $\theta = \cos^{-1}\zeta$.

[4]

Sketch another plot to show the locus of roots as ζ varies (with ω_n held constant) and indicate on your plot where $\zeta > 1$.

[4]

Comment on how ζ affects system response.

[2]