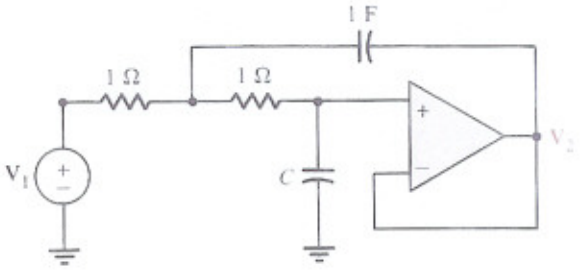
Serial #

King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE205: Electric Circuits II (031)
Quiz 6

Name: KEY ID# Sec 01

For the op-amp circuit given in the figure, find the Transfer function $\mathbf{H(s)=V_2/V_1}$ and draw the pole-zero plot for the case that $C=\frac{4}{3}$ F

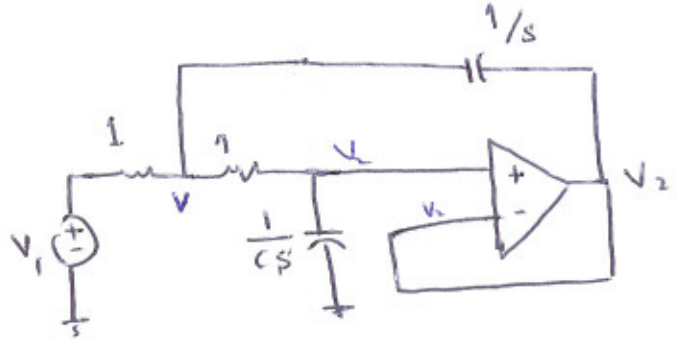


By KCL at node V

$$\frac{V-V_1}{1}+\frac{V-V_2}{1}+\frac{V-V_2}{1/s}=0$$

$$V-V_1+V-V_2+sV-sV_2=0$$

$$(s+2)V-V_1-(s+1)V_2=0$$



By KCL at node V_2 (voltage divider)

$$V_2=\frac{1/Cs}{1/Cs+1}V=\frac{1}{1+Cs}V \quad\Rightarrow\quad V=(1+Cs)V_2$$

$$\Rightarrow (s+2)(Cs+1)V_2-(s+1)V_2=V_1$$

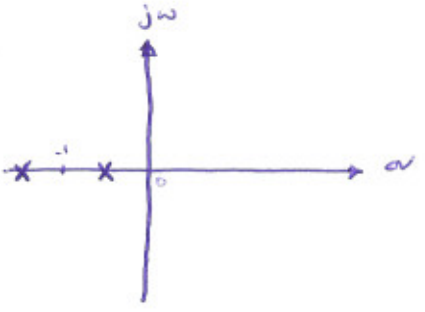
$$(Cs^2+2Cs+s+2-s-1)V_2=V_1 \Rightarrow H(s)=\frac{V_2}{V_1}=\frac{1}{Cs^2+2Cs+1}=\frac{1/C}{s^2+2s+1/C}$$

$$C=\frac{4}{3} \Rightarrow H(s)=\frac{3/4}{s^2+2s+3/4}$$

No zeros. poles:

$$\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-2\pm\sqrt{4-3}}{2}=-1\pm\frac{1}{2}$$

$$=-\frac{1}{2},-1\frac{1}{2}$$



Good Luck,
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