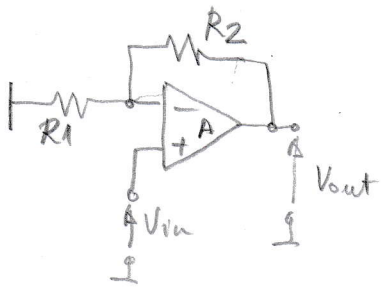
AE-20190123

1.



$$V_-\left(\frac{1}{R_1}+\frac{1}{R_2}\right) - V_{out}\frac{1}{R_2} = 0 \Rightarrow V_- = V_{out}\cdot\frac{R_1}{R_1+R_2}$$

$$V_{out} = A(V_+ - V_-) = A(V_{in} - V_-) \Rightarrow$$

$$V_{out} = A\left(V_{in} - V_{out}\frac{R_1}{R_1+R_2}\right)$$

$$V_{out}\left(1 + A\frac{R_1}{R_1+R_2}\right) = A V_{in} \Rightarrow \frac{V_{out}}{V_{in}} = \frac{A}{1 + A\frac{R_1}{R_1+R_2}}$$

$$5 = \frac{50}{1+50\cdot\frac{R_1}{R_1+R_2}} \Rightarrow 1 + 50\frac{R_1}{R_1+R_2} = 10 \Rightarrow \frac{R_1}{R_1+R_2} = \frac{9}{50} \Rightarrow 1 + \frac{R_2}{R_1} = \frac{50}{9}$$

$$\frac{R_2}{R_1} = \frac{50}{9} - 1 = 4{,}55 \Rightarrow R_1 = \frac{R_2}{4{,}55} = \frac{56k}{4{,}55} = 12{,}3\,k\Omega$$

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