EECE 2150 - Circuits and Signals: Biomedical Applications Fall 2017 - Section 3, Quiz 8

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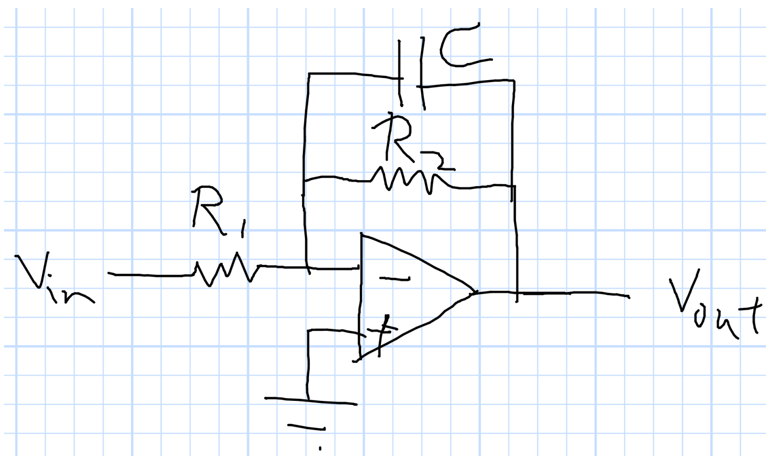
Consider the circuit in the figure. $R_1 = 50\,\Omega$, $C = 10\,\mu$F .



1. Select R_2 to provide 26 dB of mid–band gain.

$R_2 =$ ______________________________ Ω.

2. Select C to provide a cutoff frequency of 16 Hz.

$C =$ ______________________________ μF.

3. What is the phase of the gain at very low frequencies? At very high frequencies? Convert to degrees.

$f \to 0 : \phi =$ ______________________________ deg.

$f \to \infty : \phi =$ ______________________________ deg.

1. 20 dB is a factor of 100 in power, and 6 dB is a factor of 4, so the power gain is 400. $|A_v| = \sqrt{400} = 20$.

$$\frac{R_2}{R_1} = 20$$

$$R_2 = 1\,\text{k}\Omega.$$

2.

$$f_c = \frac{1}{2\pi R_2 C}$$

$$C = \frac{1}{2\pi R_2 f_c} = 9.95\,\mu\text{F}$$

3. At low frequency,

$$A_v = -\frac{R_2}{R_1}$$

. A negative real number has a phase of 180 °

At high frequency,

$$A_v = -\frac{Z_2}{Z_1} = -\frac{1}{j\omega C R_1}$$

$$= \frac{j}{\omega C R_1} = \frac{\pi}{2}$$

.

A positive real number has a phase of 90 °.