YOUR NAME(S): _____

**PROB:** The bandwidth, β, for an *RLC* filter is the difference of cutoff frequencies, $\omega_{C1}$ and $\omega_{C2}$:

bandwidth $\equiv \beta \equiv \omega_{C2} - \omega_{C1}$

where the cutoff frequencies satisfy the following equation (obtained by setting the filter gain equal to $1/\sqrt{2}$ ):

$$\frac{1}{R}\left(\omega L - \frac{1}{\omega C}\right) = \pm 1 .$$

Think of ω as *x*, and think of β as the difference between roots of the above equation, which turns out to be a quadratic equation after multiplying both sides by ω. However, the ±1 actually means we have two quadratic equations. So we have four roots! We use the two positive roots. $\omega_{C2}$ is the larger of the positive roots, and $\omega_{C1}$ is the smaller of the positive roots. The bandwidth is $\beta = \omega_{C2} - \omega_{C1}$. Remember to convert the bandwidth in Hz to bandwidth in rad/s when finding the value of *R*. Curiously, the value of *C* will be absent from your final equation for *R*.

The following information is given:

B = 1600 (bandwidth in Hz)

$\beta = 2\pi \mathrm{B}$ (to convert frequency in Hz to rad/s)

$L = 0.1$ H

Find the value of *R* for the given bandwidth.

*R* = _____