60. (a) The power consumed by the light bulb is $P = I^2R/2$. So we must let $P_{\max}/P_{\min} = (I/I_{\min})^2 = 5$, or

$$\left(\frac{I}{I_{\min}}\right)^2 = \left(\frac{\mathcal{E}_m/Z_{\min}}{\mathcal{E}_m/Z_{\max}}\right)^2 = \left(\frac{Z_{\max}}{Z_{\min}}\right)^2 = \left(\frac{\sqrt{R^2+(\omega L_{\max})^2}}{R}\right)^2 = 5 \ .$$

We solve for $L_{\max}$:

$$L_{\max} = \frac{2R}{\omega} = \frac{2(120\,\mathrm{V})^2/1000\,\mathrm{W}}{2\pi(60.0\,\mathrm{Hz})} = 7.64\times10^{-2}\ \mathrm{H} \ .$$

(b) Now we must let

$$\left(\frac{R_{\max}+R_{\mathrm{bulb}}}{R_{\mathrm{bulb}}}\right)^2 = 5 \ ,$$

or

$$R_{\max} = (\sqrt{5}-1)R_{\mathrm{bulb}} = (\sqrt{5}-1)\frac{(120\,\mathrm{V})^2}{1000\,\mathrm{W}} = 17.8\ \Omega \ .$$

This is not done because the resistors would consume, rather than temporarily store, electromagnetic energy.