

48. (a) Since $L_{\text{eq}} = L_1 + L_2$ and $C_{\text{eq}} = C_1 + C_2 + C_3$ for the circuit, the resonant frequency is

$$\begin{aligned}\omega &= \frac{1}{2\pi\sqrt{L_{\text{eq}}C_{\text{eq}}}} = \frac{1}{2\pi\sqrt{(L_1 + L_2)(C_1 + C_2 + C_3)}} \\ &= \frac{1}{2\pi\sqrt{(1.70 \times 10^{-3} \text{ H} + 2.30 \times 10^{-3} \text{ H})(4.00 \times 10^{-6} \text{ F} + 2.50 \times 10^{-6} \text{ F} + 3.50 \times 10^{-6} \text{ F})}} \\ &= 796 \text{ Hz} .\end{aligned}$$

- (b) The resonant frequency does not depend on R so it will not change as R increases.
 (c) Since $\omega \propto (L_1 + L_2)^{-1/2}$, it will decrease as L_1 increases.
 (d) Since $\omega \propto C_{\text{eq}}^{-1/2}$ and C_{eq} decreases as C_3 is removed, ω will increase.