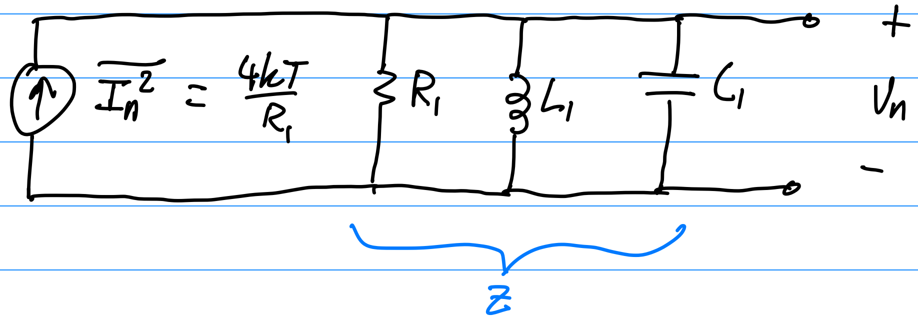
(a) With noise current added:



(b) By Ohm's law, $V_n = I_n Z$

where $Z = R_1 \,||\, j\omega L_1 \,||\, \frac{1}{j\omega C_1}$

$$\therefore H(j\omega) = \frac{V_n}{I_n} = Z = R_1 \,||\, j\omega L_1 \,||\, \frac{1}{j\omega C_1}$$

$$= \frac{1}{\frac{1}{R_1} + \frac{1}{j\omega L_1} + j\omega C_1}$$

$$= \frac{j\omega L_1 R_1}{j\omega L_1 + R_1 - \omega^2 R_1 C_1 L_1}$$

(c)
$$\overline{V_n^2} = \frac{4kT}{R_1} \left| \frac{j\omega L_1 R_1}{j\omega L_1 + R_1 - \omega^2 R_1 C_1 L_1} \right|^2$$

$$= \frac{4kT}{R_1} \times \frac{\omega^2 L_1^2 R_1^2}{(R_1 - \omega^2 R_1 C_1 L_1)^2 + \omega^2 L_1^2}$$

$$= \frac{4kT\,\omega^2 L_1^2 R_1}{(R_1 - \omega^2 R_1 C_1 L_1)^2 + \omega^2 L_1^2}$$

(d) The parallel RC tank shorts out DC and high freq.

At $\omega = \frac{1}{\sqrt{L_1 C_1}}$, its impedance is simply R_1.