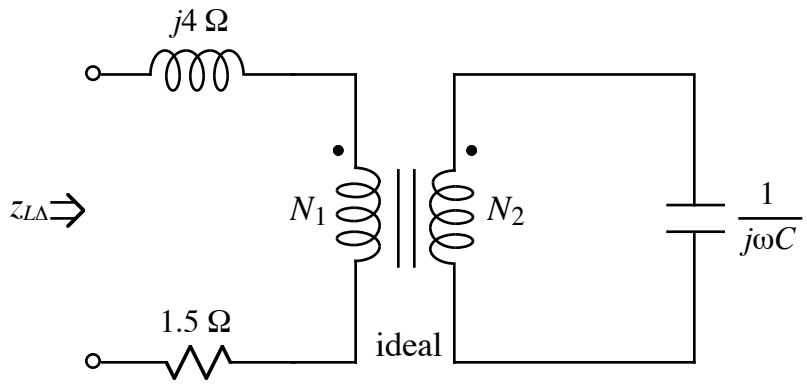
HOMEWORK #10 prob 3 solution

Ex:



Given $\omega = 300\,\text{rad/s}$ and $N_1/N_2 = 10$, find the value of C that makes $z_{L\Delta} = 1.5\,\Omega$. Note that $z_{L\Delta}$ is the equivalent impedance of the entire circuit.

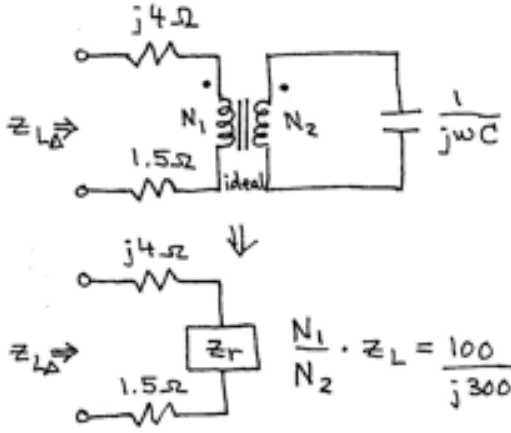
sol'n:

For an ideal transformer, the reflected impedance is

$$z_r = \left(\frac{N_1}{N_2}\right)^2 z_{L\Delta} = 10^2 \cdot z_L$$

where $z_{L\Delta}$ = load on secondary = $\frac{1}{j\omega C}$.

We replace the entire transformer and load impedance with the reflected impedance, z_r:



Now we have $z_{L\Delta} = j4\Omega - j\frac{1}{3C} + 1.5\Omega$.

We want $z_{L\Delta} = 1.5\Omega$.

Thus, $j4\Omega - j\frac{1}{3C} = 0\Omega$.

or $j\frac{1}{3C} = j4\Omega$

or $3C = \frac{1}{4}$

or $C = \frac{1}{12}\,F = 83.3\,mF$.