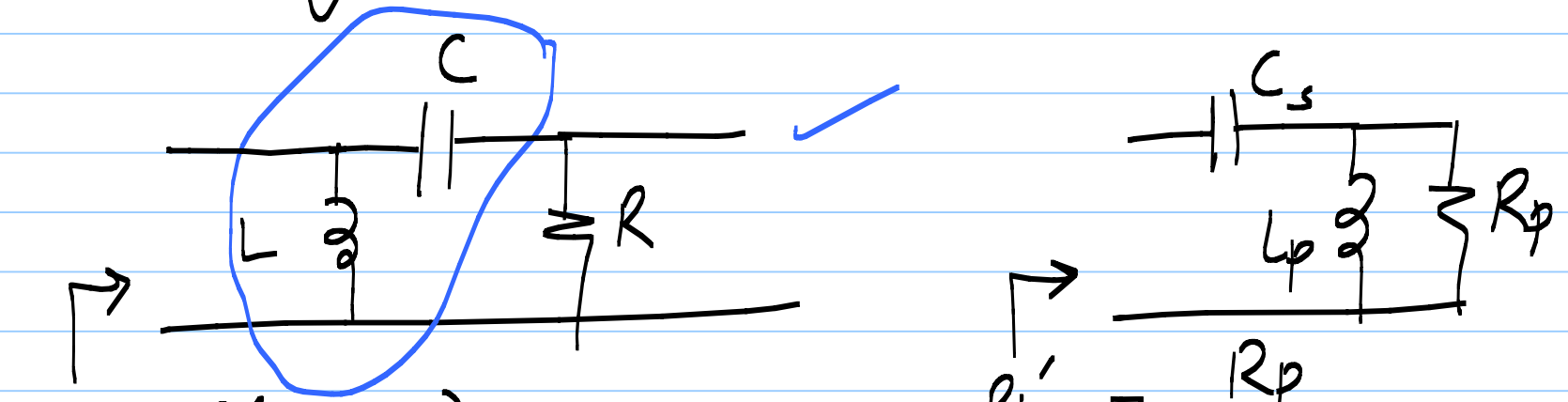
17/1/20

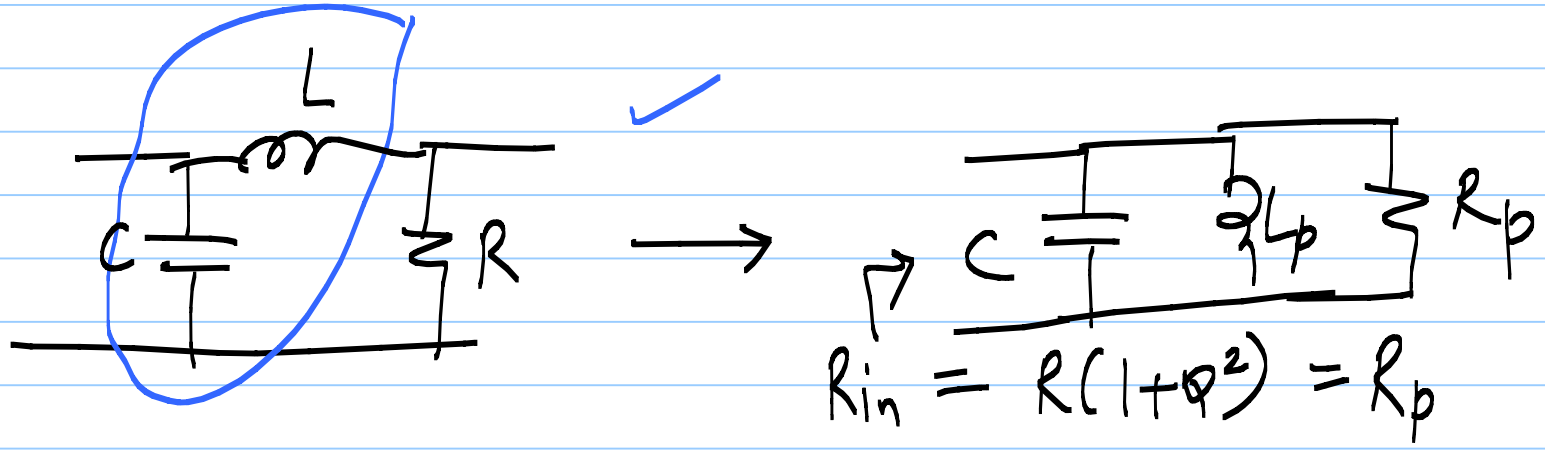
Lec 3

low Q ⟷ wideband MN

high Q ⟷ narrowband MN



"L- match" networks



E.g.

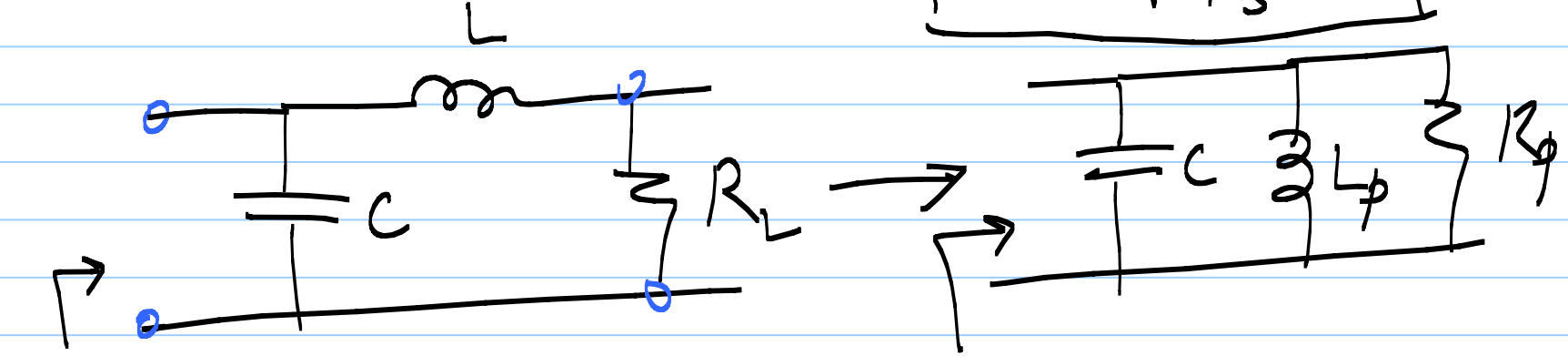
R_{in}, R_L, ω

R_{in} = 200Ω, R_L = 50Ω, ω = 1GHz

$$R_{in} = R_p = R(1+Q^2)$$

$$Q = \sqrt{\frac{R_p}{R_s} - 1}$$

(I)

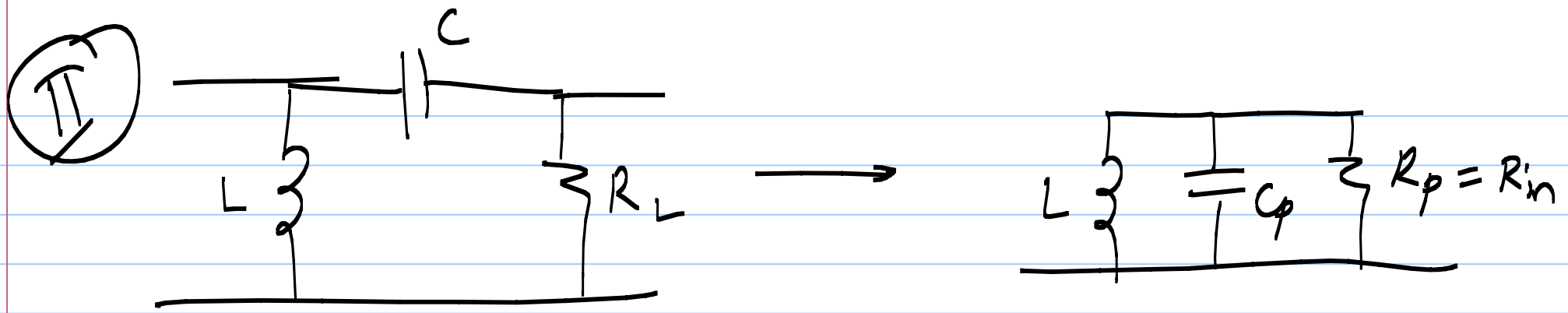


$R_{in} = R_p = 200\Omega$

$Q = \sqrt{3} = 1.732$

$Q = \omega C R_p \Rightarrow C = 1.37pF$

$Q = \omega L / R_L \Rightarrow L = 13.7nH$



$$Q = \sqrt{3} = \frac{1}{\omega C R} = \frac{R_p}{\omega L}$$

$L = 18.4\,nH$

$C = 1.84\,pF$

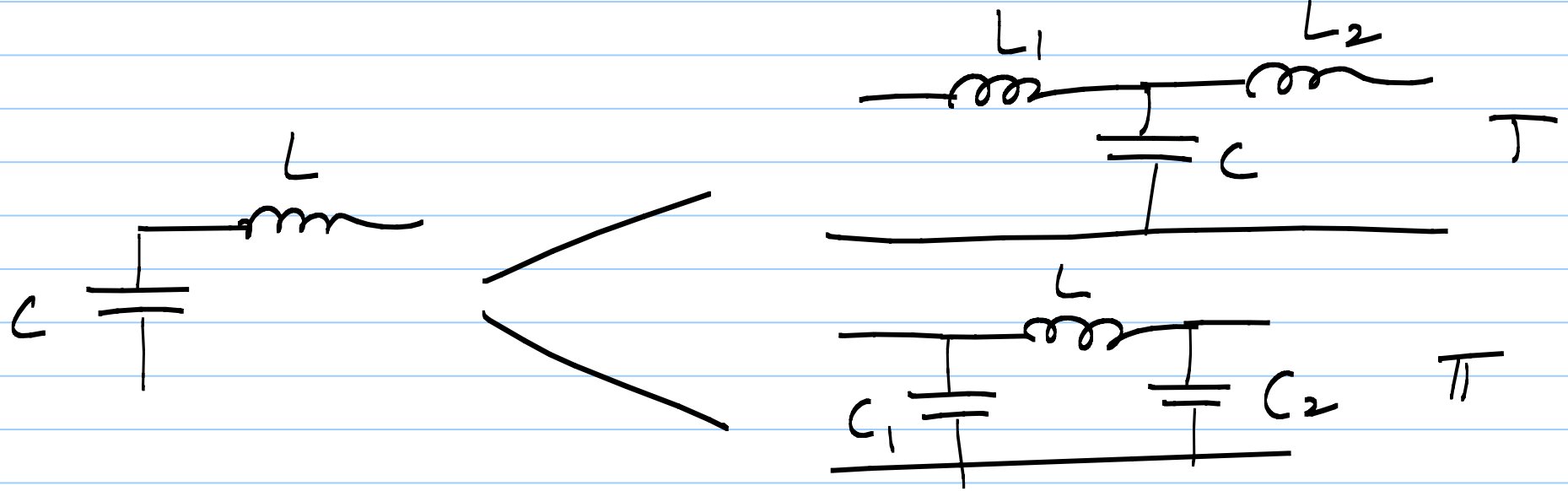
MN I is better in terms of area

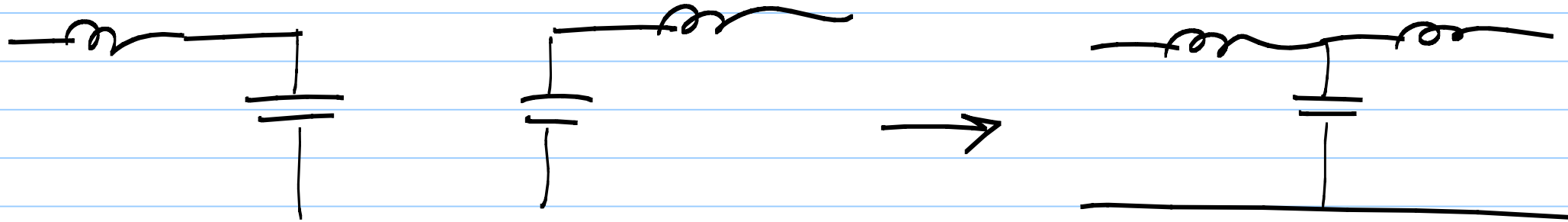
$$\omega = \frac{1}{\sqrt{LC_p}}$$

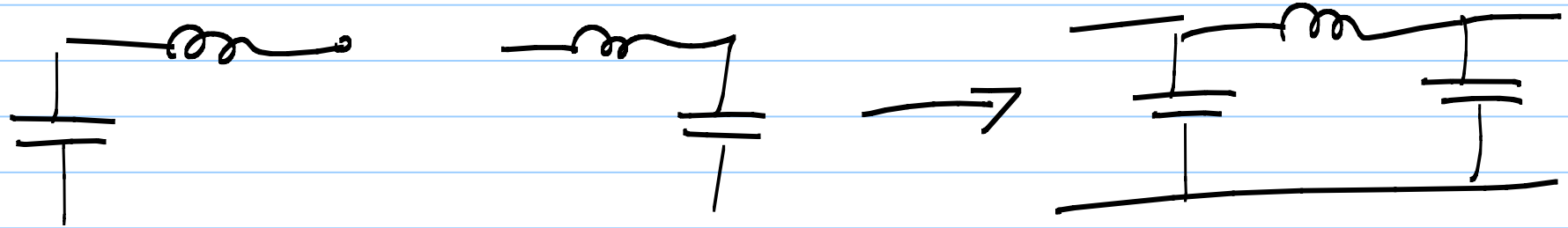
* 4 types of L-matches — up/down match
  — LP/HP match

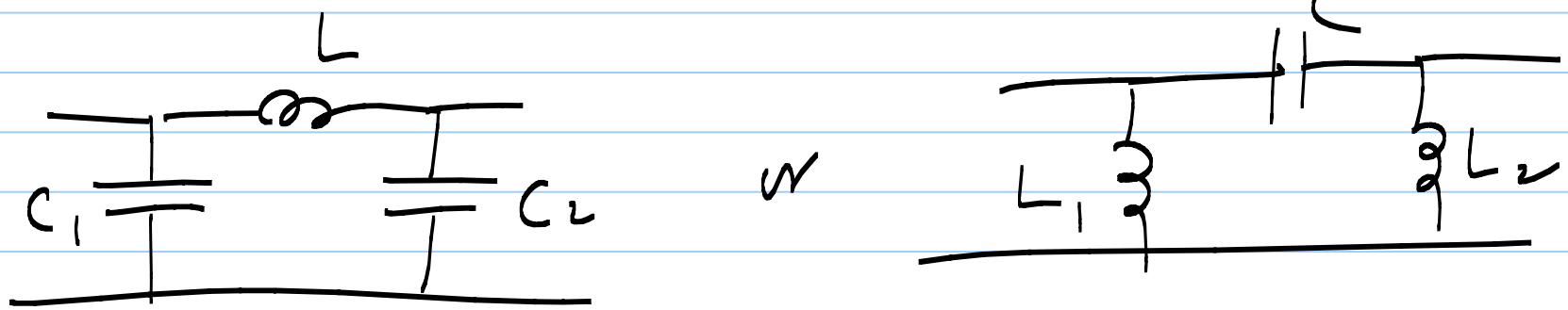
* π- an T- matches

add another degree of freedom to set Q independent of R_{in}/R_L

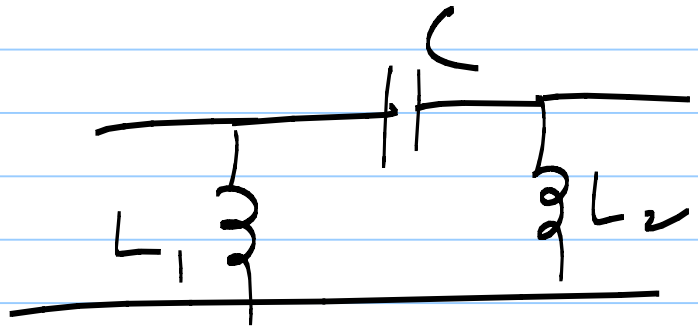


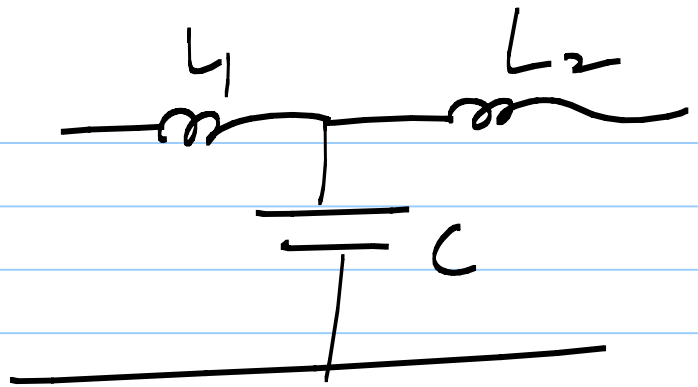




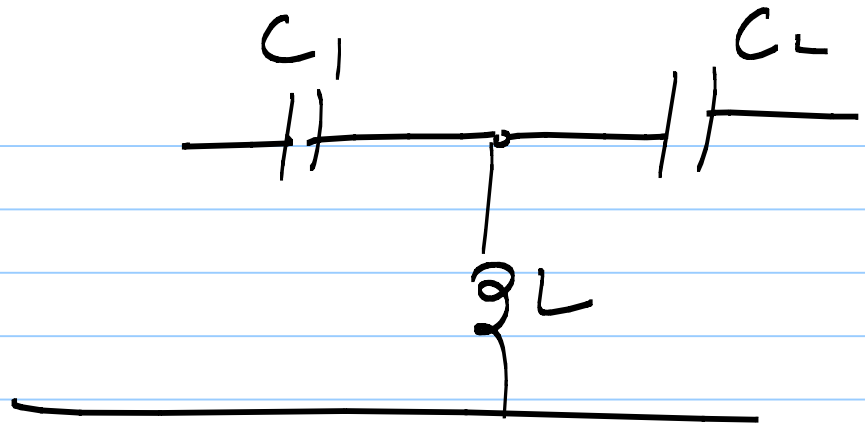


or

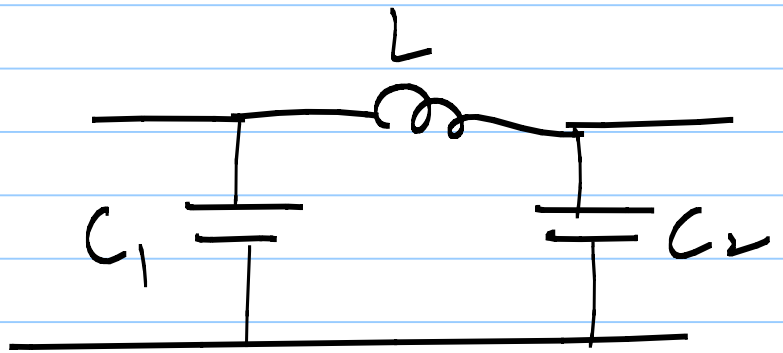


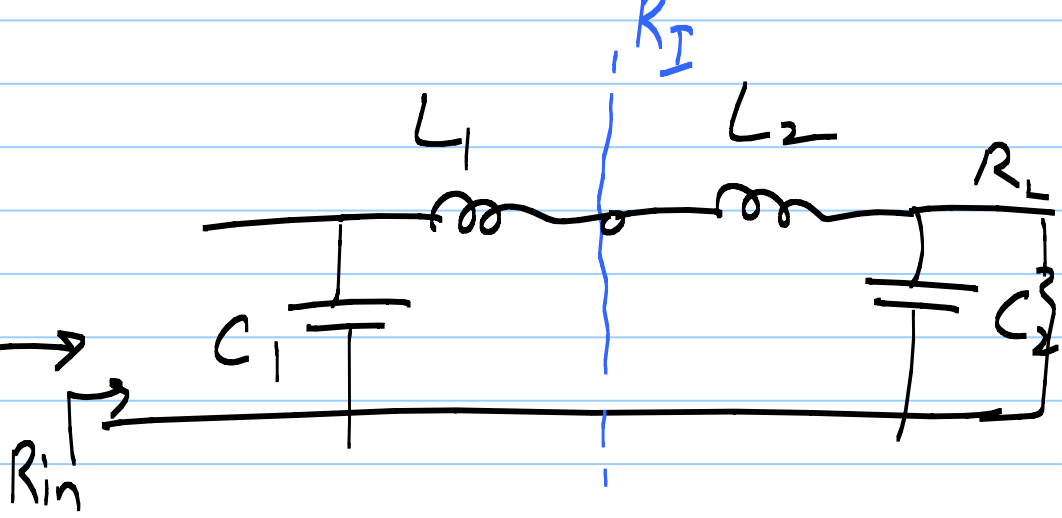


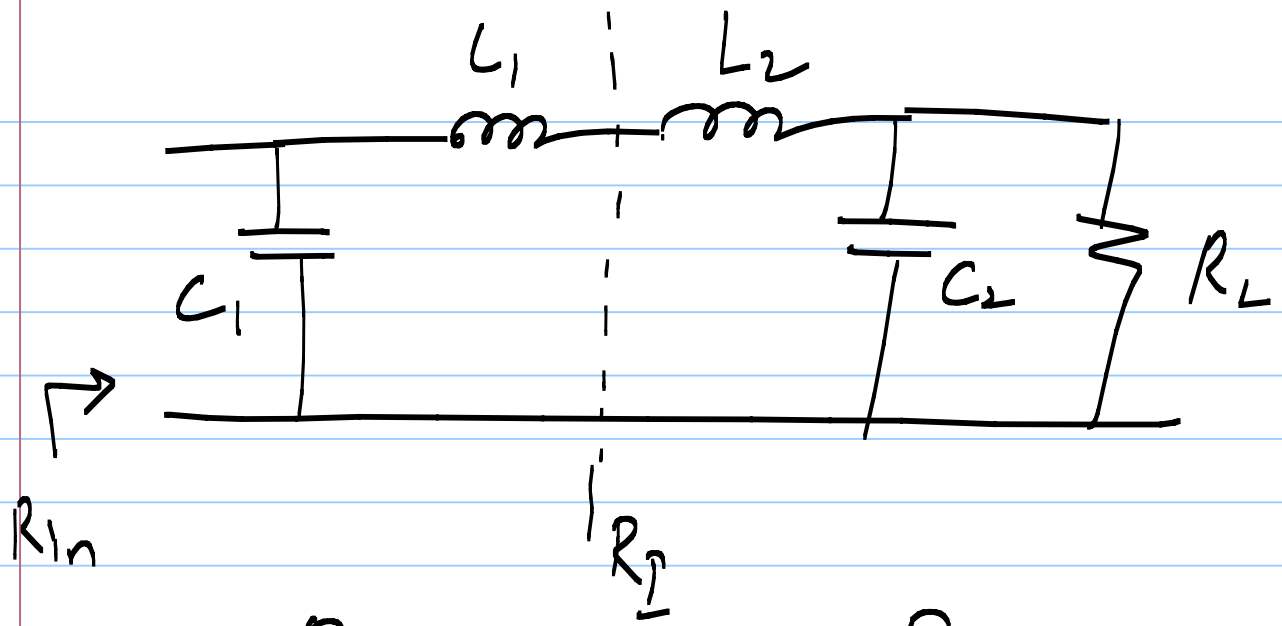
or



π - & T- matches can set Q independent of R_L/R_{in}







$$Q_R = \sqrt{\frac{R_L}{R_I} - 1}$$

$R_I < R_L$

$$Q_L = \sqrt{\frac{R_{in}}{R_I} - 1}$$

$R_I < R_{in}$

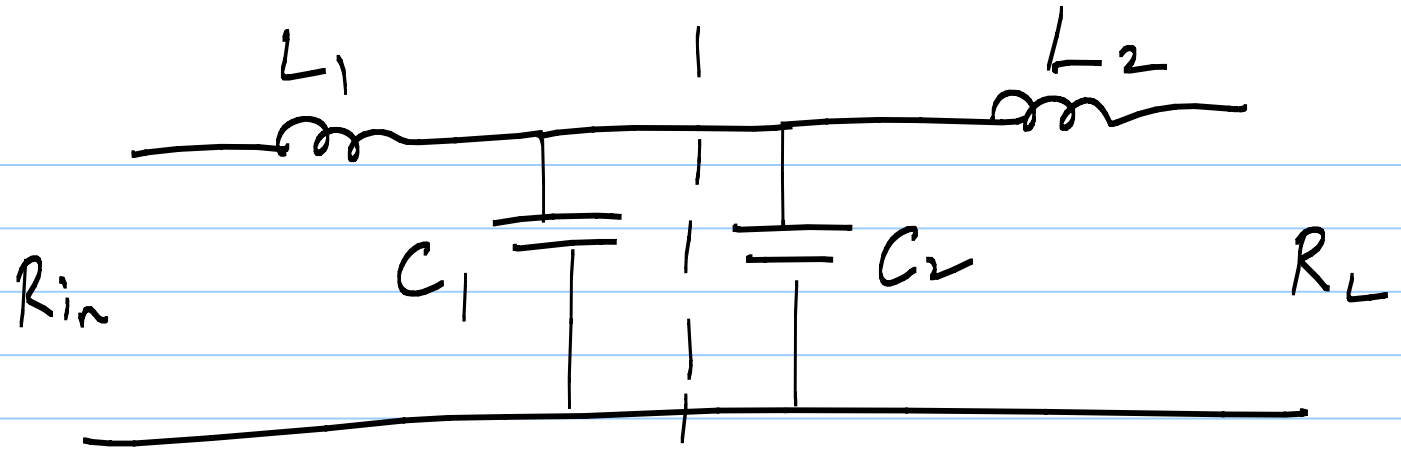
Q_L $\qquad$ Q_R

$$Q = Q_L + Q_R$$

$$Q = \sqrt{\frac{R_{in}}{R_I} - 1} + \sqrt{\frac{R_L}{R_I} - 1}$$

high Q $\leftrightarrow$ small R_I

* Transformer matching is also possible as a MN



$$R_T > R_{in}, R_L$$

$$Q = \sqrt{\frac{R_T}{R_L} - 1} + \sqrt{\frac{R_T}{R_{in}} - 1}$$

Q_R $\qquad$ Q_L