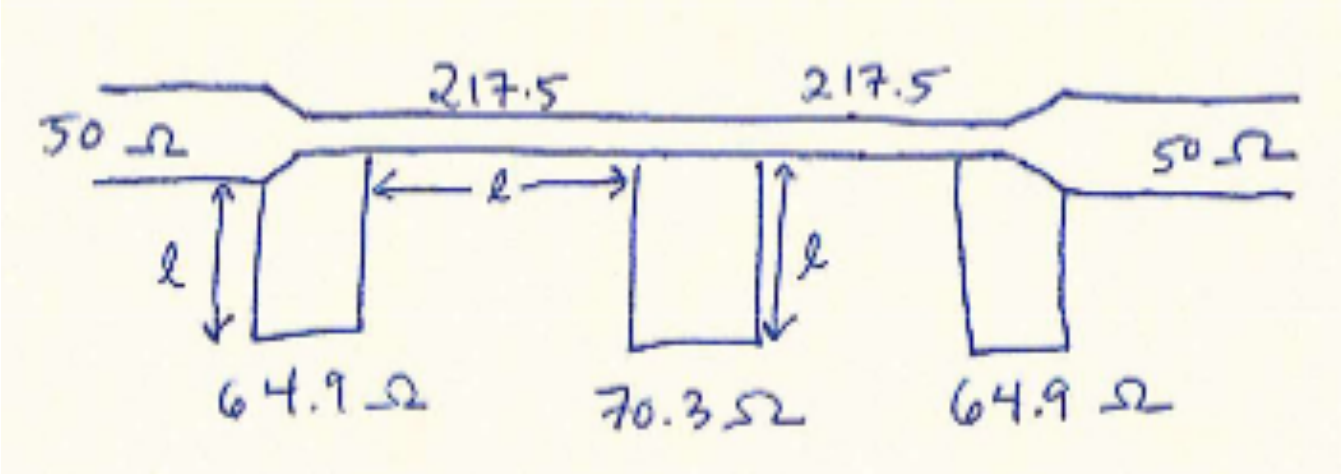
Remind: Insertion Loss Method: Example 1

Design a filter with $\omega_c = 6\ GHz, 15\ dB\ attenuation\ at\ 8\ GHz, Z_o = 50\ \Omega,$ $3\ dB\ equal\ ripple$

$Z_0 = 4.35 * 50 = 217.5\ \Omega$

$Z_0 = 1.299 * 50 = 64.9\ \Omega$

$Z_0 = 1.405 * 50 = 70.3\ \Omega$



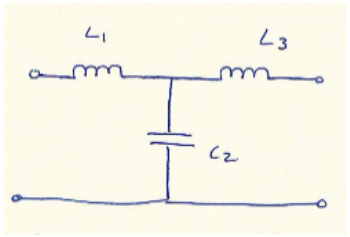
Remind: Insertion Loss Method: Example 1

- $\omega_c = 6\,GHz, 3rd\ order, Z_o = 50\ \Omega, 3\,dB\ equal\ ripple,$ $15\,dB\ attenuation\ at\ 8\,GHz$

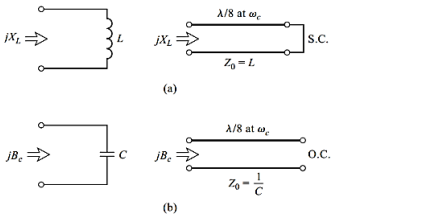
3.0 dB Ripple

N	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	g_9	g_{10}	g_{11}
1	1.9953	1.0000									
2	3.1013	0.5339	5.8095								
3	3.3487	0.7117	3.3487	1.0000							
4	3.4389	0.7483	4.3471	0.5920	5.8095						
5	3.4817	0.7618	4.5381	0.7618	3.4817	1.0000					
6	3.5045	0.7685	4.6061	0.7929	4.4641	0.6033	5.8095				
7	3.5182	0.7723	4.6386	0.8039	4.6386	0.7723	3.5182	1.0000			
8	3.5277	0.7745	4.6575	0.8089	4.6990	0.8018	4.4990	0.6073	5.8095		
9	3.5340	0.7760	4.6692	0.8118	4.7272	0.8118	4.6692	0.7760	3.5340	1.0000	
10	3.5384	0.7771	4.6768	0.8136	4.7425	0.8164	4.7260	0.8051	4.5142	0.6091	5.8095

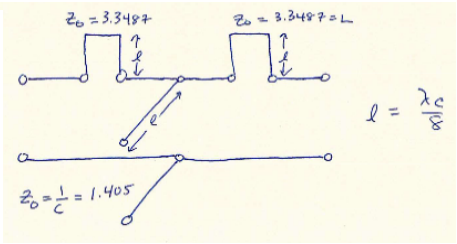
$$g_1 = 3.3487 = L_1$$
$$g_2 = 0.7117 = c_2$$
$$g_3 = 3.3487 = L_3$$
$$g_4 = 1 = R_L$$



Convert L's and C's to stubs:
using Richard's transformation

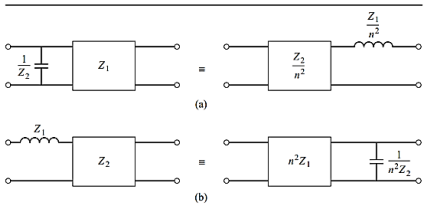


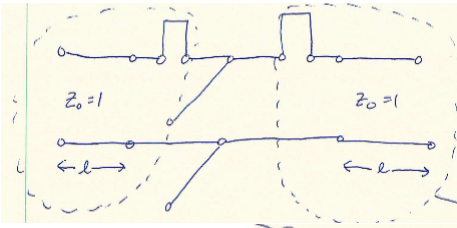
Richards' transformation. (a) For an inductor to a short-circuited stub. (b) For a capacitor to an open-circuited stub.



Add unit elements at end of filter:
use Kuroda Identities

TABLE 8.7 The Four Kuroda Identities ($n^2 = 1 + Z_2/Z_1$)





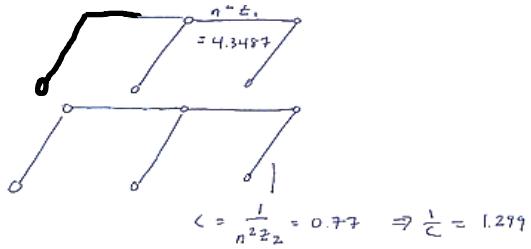
Replace with 2nd identity

$Z_1 = 3.3487$

$Z_2 = 1$

$n^2 = 1 + \frac{Z_2}{Z_1} = 1.3$

Replace with identity or
using symmetry

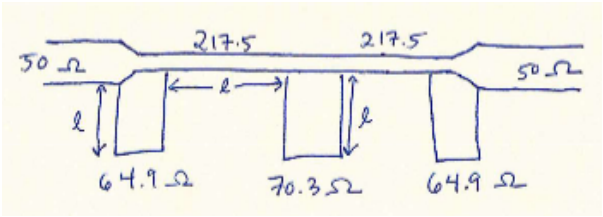


Impedance scale

$Z_0 = 4.35 * 50 = 217.5\ \Omega$

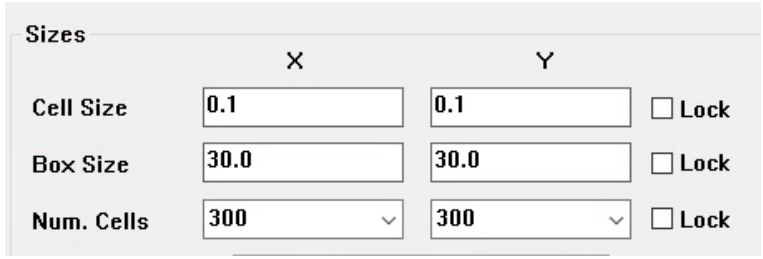
$Z_0 = 1.299 * 50 = 64.9\ \Omega$

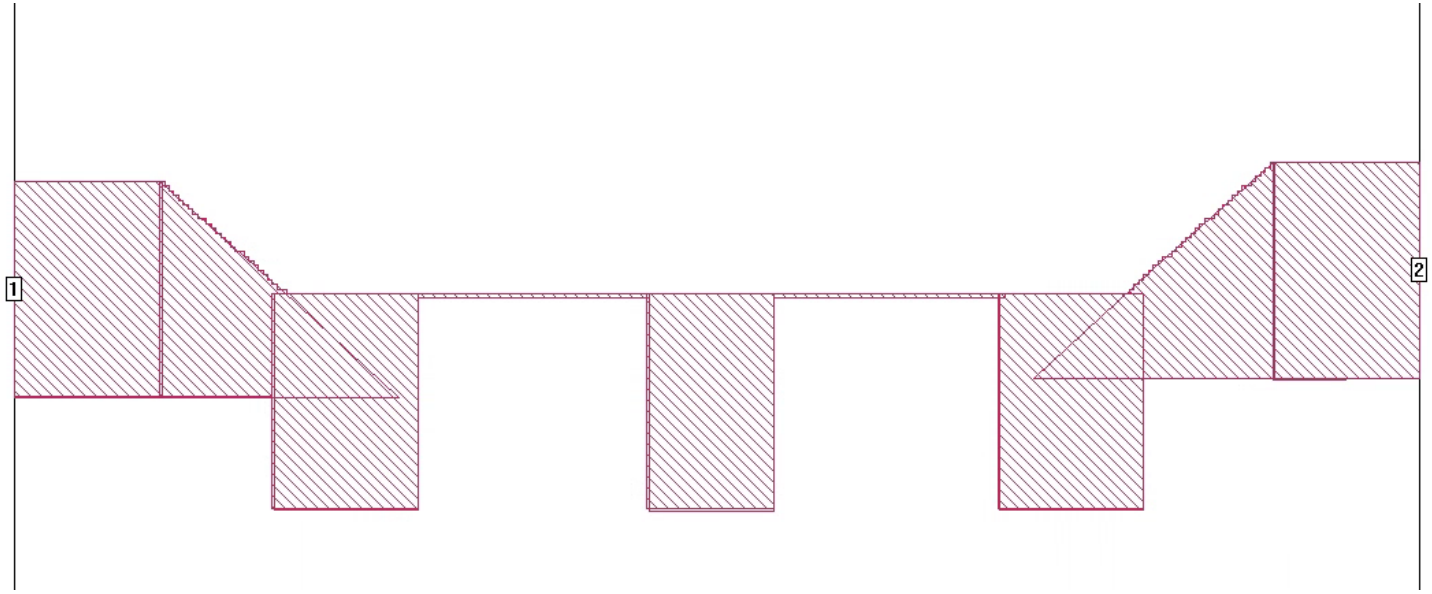
$Z_0 = 1.405 * 50 = 70.3\ \Omega$



Insertion Loss Method LPF Sonnet Assignment

- Using the geometry obtained from the insertion loss LPF example 1, plot S11 and S22
  - Cell size = 0.1x0.1
  - Box size = 30 x 30
  - Use Rogers 5880 (Er=2.2 d=1.5 mm)





Insertion Loss Method LPF Assignment
(Due April 20th Midnight Online Submission)

- Geometry

❑ **Simulation Results (S11 and S21)**

Discuss the simulation results

1.
2.
3.