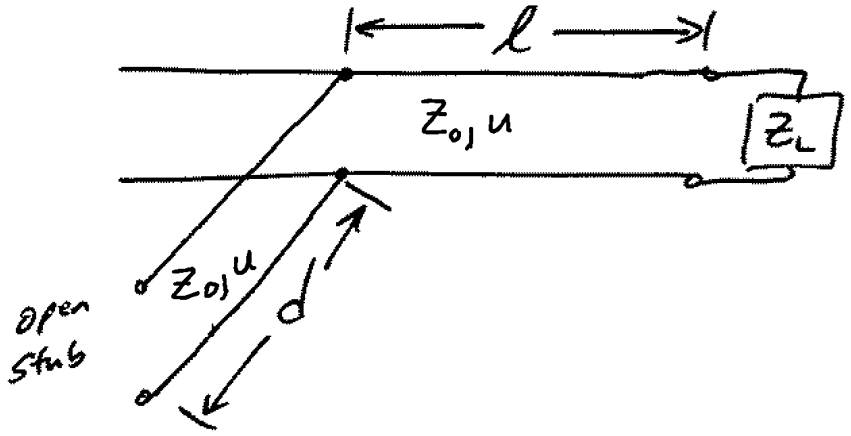
PE 11.7 A 75 Ω lossless line is to be matched to a load of 100 -*j*80 Ω with **an open circuit** stub. Calculate the stub length, its distance from the load, and the necessary stub admittance.

- Find both possible solutions, and sketch resulting circuits.



1) $z_L = \frac{Z_L}{Z_0} = \frac{100 - j80}{75} = 1.\overline{3} - j1.0\overline{6}$ Ω/Ω } plot on Smith Chart

$y_L = \frac{1}{z_L} = 0.4573 + j0.36585$ S/S

2) Draw circle through z_L & y_L

3) Note two match points & distances from y_L

$y_{m1} = 1 + j0.97$ S/S, $\ell_1 = 0.1615\lambda - 0.067\lambda = \underline{0.0945\lambda}$

$y_{m2} = 1 - j0.97$ S/S, $\ell_2 = 0.339\lambda - 0.067\lambda = \underline{0.272\lambda}$

4) Find lengths of <u>open</u> circuit stubs so that

$y_{stub\,1} = -j0.97$ S/S $\quad d_1 = 0.3779\lambda$

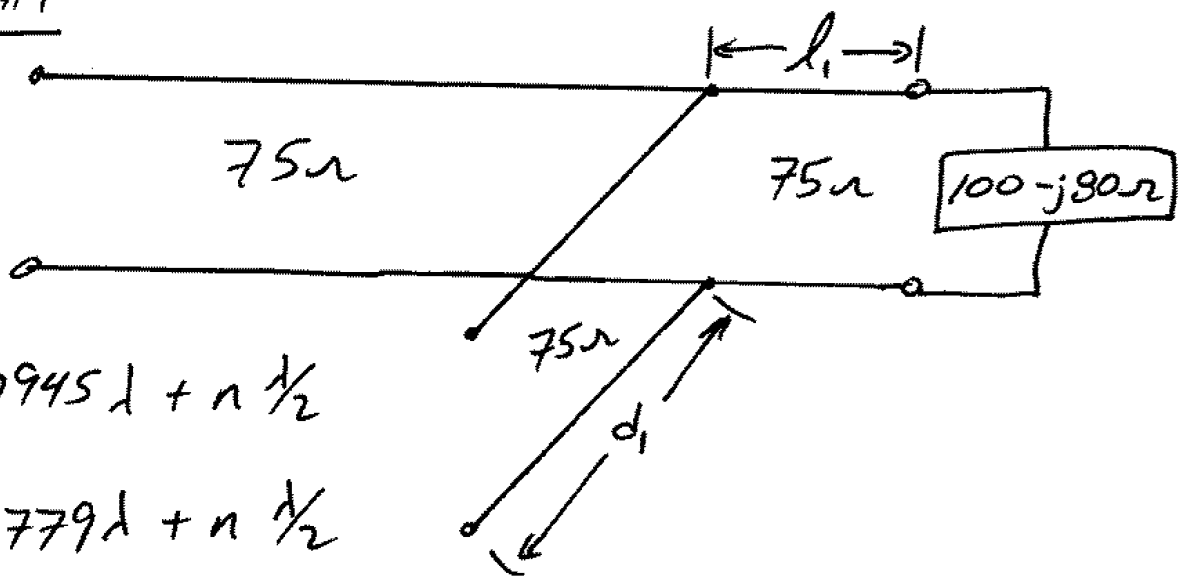
$y_{stub\,2} = +j0.97$ S/S $\quad d_2 = 0.1221\lambda$

Find actual stub input admittances

$y_{stub1} = -j0.97\ S/S$ $\quad Y_{stub1} = \frac{y_{stub1}}{z_0} = -j12.93\ mS$

$y_{stub2} = +j0.97\ S/S$ $\quad Y_{stub2} = \frac{y_{stub2}}{z_0} = +j12.93\ mS$

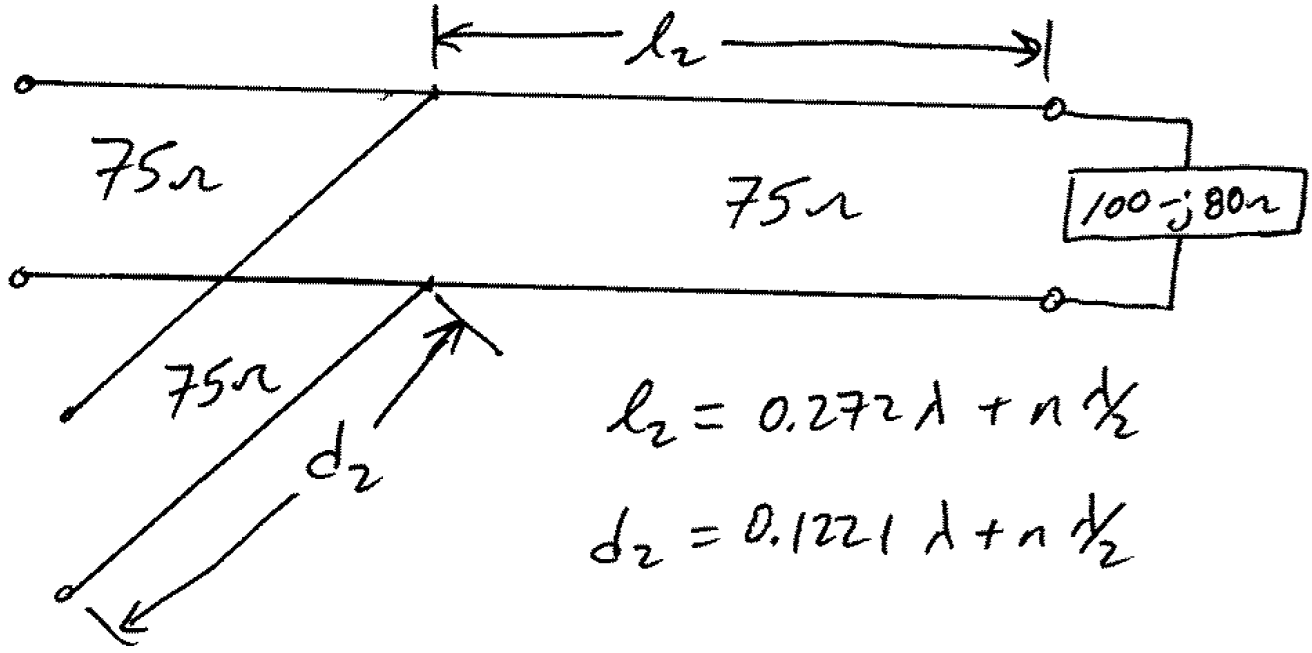
Match #1



$l_1 = 0.0945\lambda + n\,\lambda/2$

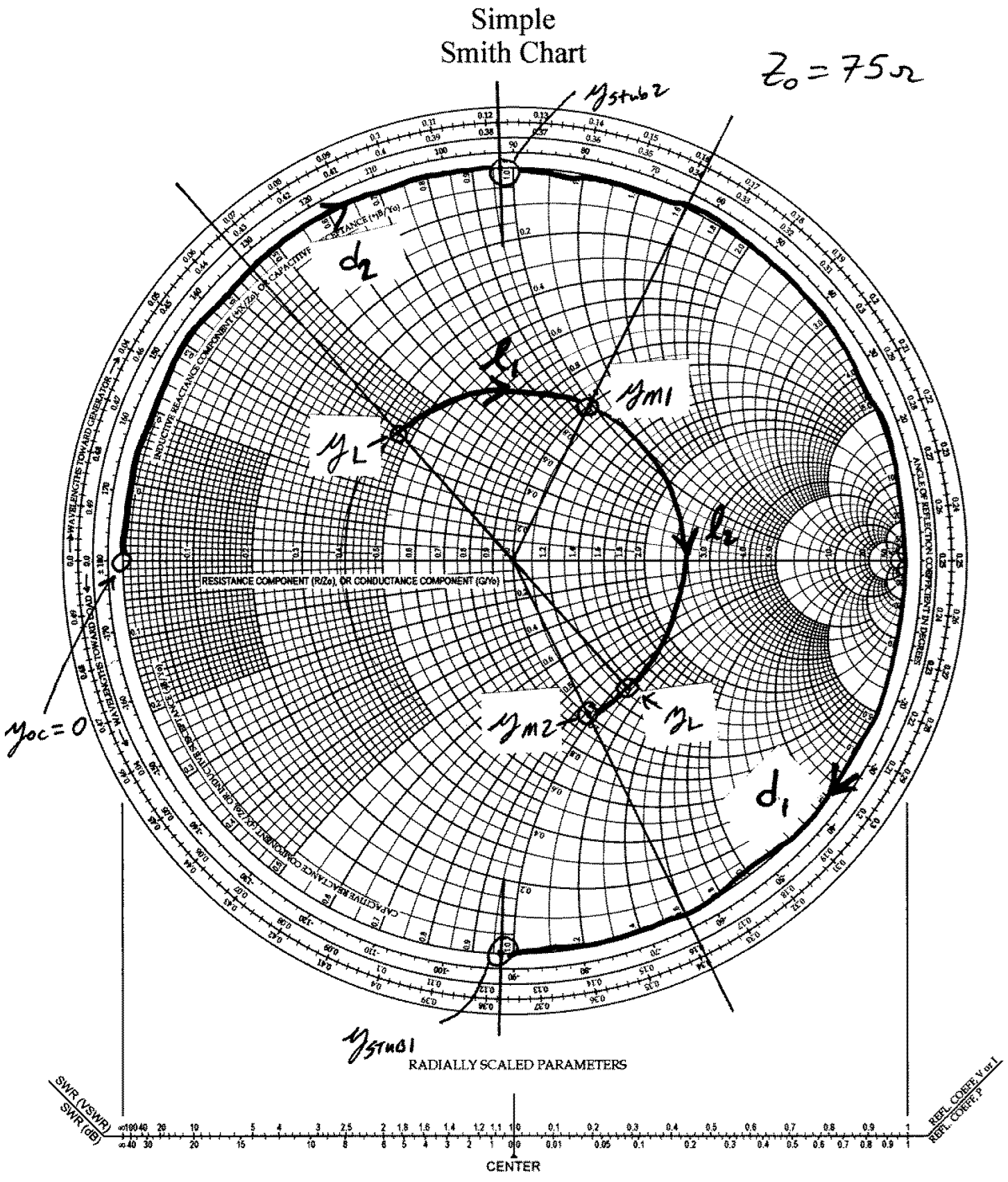
$d_1 = 0.3779\lambda + n\,\lambda/2$

Match #2



$l_2 = 0.272\lambda + n\,\lambda/2$

$d_2 = 0.1221\lambda + n\,\lambda/2$


Simple
Smith Chart
$z_o = 75\Omega$
y_{stub2}
d_2
l_1
y_{M1}
y_L
l_2
RESISTANCE COMPONENT (R/Zo), OR CONDUCTANCE COMPONENT (G/Yo)
$y_{oc} = 0$
y_{M2}
y_L
d_1
y_{stub1}
RADIALLY SCALED PARAMETERS
SWR (VSWR)
SWR (dB)
REFL. COEFF. V or I
REFL. COEFF. P
CENTER