\[ z_{-} = 1 + j 0.5 \]
\[ z_{L} = 0.5 - j 1 \]
\[ z_{L^{*}} = 0.5 + j 1 \]
Normalized Impedance and Admittance Coordinates

\[ Z_0 = 50 \, \Omega \]

\[ f = 1 \, \text{GHz} \]

\[ R_L = 80 \, \Omega, \quad C_L = 2.65 \, \text{pF} \]

\[ Z_L = R_L - j\omega C_L = (80 - j60) \, \Omega \]

\[ Z_L = 1.6 - j1.2 \]

\[ Z^* = 1 \]

\[ Z^* = 1 \]

Series L

\[ L = \frac{X_L Z_0}{W} \]

\[ \text{Shunt L} \]

\[ L = -\frac{Z_0}{W} \]

Series C

\[ C = -\frac{1}{Z_0} \, \text{in fr } \]

\[ C = \frac{1}{j} \, \text{fr } \]

\[ C = \frac{1}{j} \, \text{fr } \]

Nodal \[ Q \text{ at point } B \]

\[ Q_n = \frac{X_L}{R_L} = \frac{12}{1} = 12 \]

Radially Scaled Parameters

Final Value C 0.03 pF Series L + j1.2
Single-stub matching network example

For example 8-8

\[ z_1 = (60 - j45) \, \Omega \]

\[ z_{in} = (75 + j90) \, \Omega \]

\[ z_0 = 75.52 \]

We are using topology A from the text.
### Case A

1. Plot \( Z_L, Z_{in} \), record value of \( Y_L \)
   
   \[ Z_L = 0.8 - j0.6 \quad Y_L = 0.8 + j0.6 \]
   \[ Z_{in} = 1.0 + j1.2 \]

2. Draw a VSWR circle for \( Z_{in} \)

3. From position of \( Z_L \), travel along constant \( q \) (down) until you intersect \( VSWR \) circle. This is position A.

   Record \( Y_A \) \( \Rightarrow Y_A = 0.8 + j1.1 \)

4. Determine stub susceptance values by subtracting \( Y_A \) from \( Y_L \)

   \[ jb_{SA} = Y_A - Y_L = (0.8 + j1.1) - (0.8 + j0.6) \]
   \[ jb_{SA} = j0.5 \]

   This is the amount of susceptance that puts you on the VSWR circle.

5. From point A and \( Z_{in} \), draw lines extending through center of SC through points. Measure distance from \( Z_{in} \) to \( Y_A \) in wavelengths

   \[ l_{UA} = [(0.5 - 0.404) + 0.167] \lambda = 0.263 \lambda \]

### Case B

1. \( Z_L = 0.8 - j0.6 \)
   \[ Y_L = 0.8 + j0.6 \]
   \[ Z_{in} = 1.0 + j1.2 \]

2. Same

3. The arrow has been drawn for you in position B.

   Record \( Y_B \) \( \Rightarrow Y_B = 0.8 - j1.08 \)

   \[ jb_{SB} = Y_B - Y_L = 0.8 - j1.08 - (0.8 + j0.6) \]
   \[ jb_{SB} = -j1.68 \]

   \[ (0.25 + 0.084) \lambda \]

   \[ l_{SB} = 0.334 \lambda \]

   \[ (0.167 - 0.094) \lambda \]

   \[ l_{SB} = 0.673 \lambda \]
Normalized Impedance and Admittance Coordinates

\[ z_l = 0.8 - j0.6 \]
\[ z_{in} = 1 + j1.2 \]
Path B
\[ y_B = 0.8 - j 1.68 \]

\[ l_B = 0.073 \lambda \]

\[ l_B = (0.25) \lambda + (0.084\lambda) = 0.33 \lambda \]