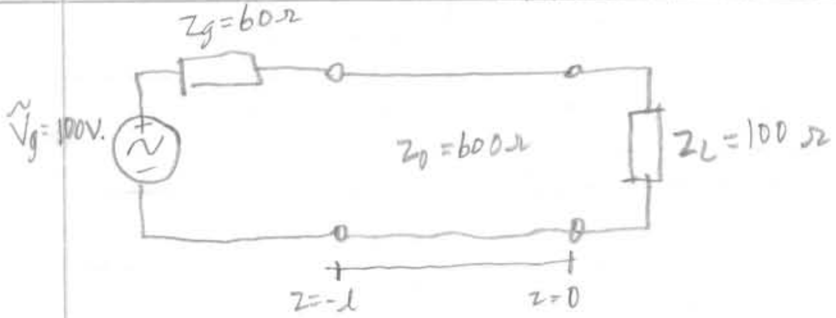
Zin on lossless tx-line



$l = 0.1\lambda$

$\beta = 2\pi/\lambda$

$\beta l = (2\pi/\lambda)(0.1\lambda) = 0.2\pi$ rad/m

$$Z_{in}(-l) = \frac{Z_L + jZ_0 \tan(\beta l)}{Z_0 + jZ_L \tan(\beta l)} Z_0$$

$$= \frac{100 + j60 \tan(0.2\pi)}{60 + j100 \tan(0.2\pi)} \cdot 60 \quad [2]$$

$$= \frac{100 + j60(0.726)}{60 + j100(0.726)} \cdot 60$$

{Note: Because tan(βl) didn't simplify the formula I would plug equation [2] into a calculator to get the answer at this point.}

$$= \frac{100 + j43.593}{60 + j72.655} \cdot 60$$

Note: $\frac{z_1}{z_2} = \frac{x_1 + jy_1}{x_2 + jy_2} = \frac{(x_1x_2 + y_1y_2) + j(x_2y_1 - x_1y_2)}{x_2^2 + y_2^2}$ Ulaby (1.48a

$$= \frac{(100 \cdot 60 + 43.593 \cdot 72.655) + j(60 \cdot 43.593 - 100 \cdot 72.655)}{60^2 + 72.655^2} \cdot 60$$

$$= \frac{9167.25 - j4649.92}{3600 + 5278.75} \cdot 60$$

$$= 61.95 - j31.42$$

$$= 69.46 \angle -26.89^\circ$$