EE3140 Quiz 6, Spring 2003

1. Determine the load impedance, VSWR, and the load reflection coefficient for a transmission line with \( Z_{in} = (30 - j100)\Omega \), \( Z_o = 50\Omega \), and length 0.4\( \lambda \). Work must be shown for full credit, whether or not the Smith chart is used.

(a) \( Z_L = (4 \text{ points}) \)

\[
Z_{in} = \frac{30 - j100}{50} = 0.6 - j2.0 \quad Z_L = \frac{0.15 - j0.55}{7.5 - j27.5} = 0.75 - j27.3 \Omega
\]

(One can also use eq. 6.27, solve it for \( Z_L \) and get 7.38 - j27.3 \( \Omega \))

(b) VSWR = (2 points) \( \text{From Smith chart, } \text{VSWR} = 9.0 \)

(Or one can also use eq. 6.29 and get \( \text{VSWR} = 8.85 \))

(c) \( \Gamma_L = (4 \text{ points}) \)

\[
|\Gamma_L| = 0.81 \quad \angle \Gamma_L = -121^\circ
\]

(One can also use eq. 6.26 and get)

\[
\Gamma_L = -0.42 - j0.676 = 0.796 \angle -122^\circ
\]