

EEL 3472  
HOMEWORK #4  
DUE FRIDAY, FEBRUARY 6, 2009

1. Ulaby, Problem 2.21
2. If the maximum magnitude of the voltage on a lossless transmission line fed by a sinusoidal time-varying source is 15 Volts and the minimum magnitude is 5 Volts, what are the possible reflection coefficients at the load if (a) the load impedance is real and (b) the load impedance is purely imaginary.
3. A unit step function voltage is applied to a lossless transmission line whose generator impedance and whose characteristic impedance are both  $Z_0$  and whose load end is a short circuit,  $Z_L = 0$ . Plot the voltage and current vs. time in the middle of the line ( $l/2$ ) as a function of time from  $t = 0$  to  $t = 3T$ , if the one-way signal transit-time is  $T$ .
4. A unit step function voltage is applied to a lossless transmission line whose generator impedance and whose load impedance are both  $2Z_0$ , with  $Z_0$  being the characteristic impedance of the line. If the line is " $\ell$ " long, plot the voltage and current at the mid-point of the line vs. time from  $t = 0$  to  $t = 3\ell/c$  where " $c$ " is the speed of the wave on line. What are the values of voltage and current after an infinite number of reflections from each end of the line?