(1) A 50 Ω, 10.5 m long air transmission line terminated with a load impedance of \( Z_L = 70 + j10 \) Ω is excited by a sinusoidal voltage source, as shown.

Calculate the following:

(a) The load reflection coefficient \( I_L \).
(b) The standing wave ratio \( S \) on the line.
(c) Find all the \( V_{\text{max}} \) and \( V_{\text{min}} \) positions (in actual lengths) on the line and present your results in a table form.
(d) Find the input impedance \( Z_{\text{in}} \) seen at each \( V_{\text{max}} \) and \( V_{\text{min}} \) position.
(e) Find the input impedance \( Z_{\text{in}} \) seen at the source end of the line and draw the equivalent lumped circuit with respect to the source end.
(f) Find the phasor voltages \( V_S, V^*, V, \) and \( V_L \).
(g) Find the \( V_{\text{max}} \) and \( V_{\text{min}} \) values.
(h) Find the time-average powers \( P^+, P^-, P_{RS}, P_L, \) and \( P_{\text{source}} \). What percentage of the power carried by the incident wave reflects back to the source?
(i) (Optional) Find the positions on the line where \( Z_{\text{in}} = Z_0 + jX_{\text{in}} \). Find \( X_{\text{in}} \) values at these positions.
(j) (Optional) Find the \( I_{\text{max}} \) and \( I_{\text{min}} \) positions on the line.
(k) (Optional) Find the \( I_{\text{max}} \) and \( I_{\text{min}} \) values.
(l) Repeat all the above calculations for a load impedance of \( Z_L = 15 - j35 \) Ω.

An Important Reminder Note:
EE 301-Midterm # 2 is scheduled to be given on Wednesday, April 18, 2012! 🌟
(It will be in-class closed-book exam. Two formula sheets will be allowed.)