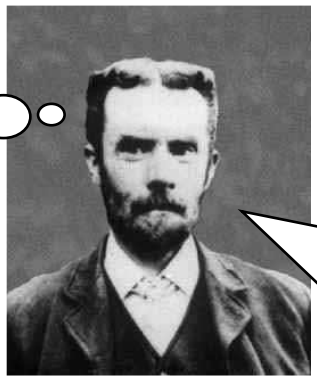
University of Portland
School of Engineering

EE 301-Electromagnetic Fields-3 cr. hrs.
Spring 2009

You will pay a heavy price for giving these students such tough tests and scaring them to death Inaaan! @*$*#&XΘχ@*§ξ!



Best of luck to you EE 301 students and please, demonstrate to Inan that unlike what everyone might think, his tests are nothing but simply a piece of cake! (Bring his fame down about giving challenging exams!) Also, enjoy your leap day this Friday before it's over!

Midterm Exam # 1

(Prepared by Professor A. S. Inan)

(Friday, February 27, 2009)
(Closed Book Exam; 1 Formula Sheet Allowed)
(Total Time: 55 mins.)

Name:_____ ☺

Signature:_____ ☺

"Honesty is the best policy."
Aesop (~ 620B.C. –?)

"An honest mind possesses a kingdom."
Lucius Annaeus Seneca (4B.C.–65A.D.)

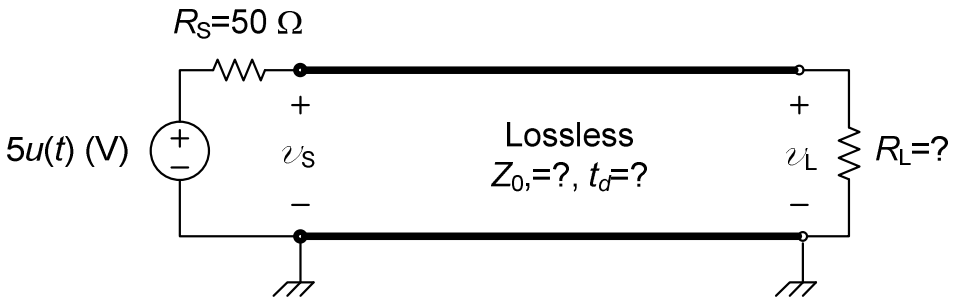
"Honest people are the true winners of the universe."
Anonymous

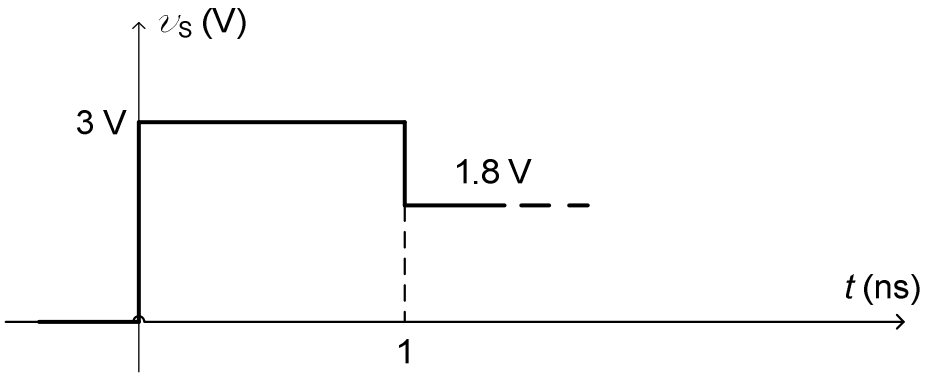
"Honesty is not for sale."
A. Inan

(1) (15 mins., Total: 30 points) **TDR characterization.** A TDR experiment is constructed to determine the unknown parameters of a distributed circuit as shown. Based on the source-end voltage waveform observed on the TDR scope (provided below):

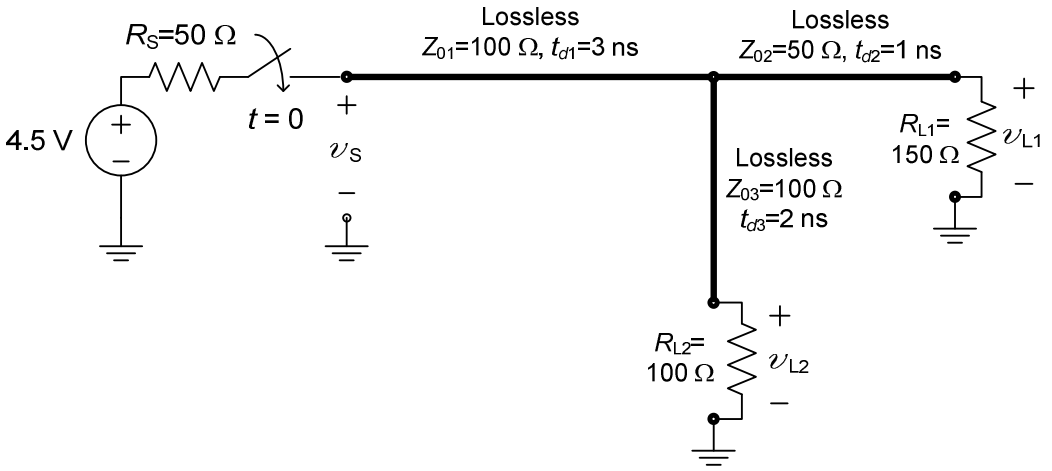
(a) (20 points) Determine the values of Z_0, t_d, and R_L. Show your work clearly. (Use a bounce diagram.)

(b) (10 points) Sketch the load-end voltage v_L as a function of time t for the time interval $0 \le t \le 2$ ns.





(2) (15 mins., 35 points) **Multiple transmission lines.** For the three transmission-line circuit shown, the switch closes at $t = 0$. Assuming all the lines to be uncharged before $t = 0$, sketch voltages v_S , v_{L1} and v_{L2} between $t = 0$ to 10 ns. Use bounce diagram. Provide all the pertinent values on your sketch.



(3) (15 mins., 35 points) **Reactive termination.** In the transmission-line circuit shown, the switch closes at $t = 0$, after being open for a long time. Find the complete mathematical expressions and sketch both the source-end voltage v_S and the load-end voltage v_L as a function of time. Sketch the two waveforms separately. Provide all the pertinent values on each sketch.