## ECE 546 HOMEWORK No 3 - SOLUTIONS

1. Write a MATLAB program that simulates the response (voltage at near and far ends) of a losseless transmission line terminated with linear resistive loads. Test your program using the example shown below . Use  $Z_0 = 75 \Omega$ ,  $\tau = 2.37 \text{ ns}$ ,  $Z_1 = 50 \Omega$ ,  $Z_2 = 1 \text{ K}\Omega$ . Optimize your code to minimize run time. Show plots of the pulse response at the near and far ends of the line. Give a listing of your program.



The pulse characteristics for  $V_g(t)$  are as shown in the figure below, with

time delay:  $t_d = 1$  ns rise time:  $t_r = 1$  ns fall time:  $t_f = 1$  ns pulse width:  $t_w = 20$  ns





Use the following equations:

$$v_{f1}(t) = \Gamma_1 v_{b2}(t - \tau) + T_1 v_s(t) \qquad v_{b2}(t) = \Gamma_2 v_{f1}(t - \tau)$$
  

$$v_{f2}(t) = v_{f1}(t - \tau) \qquad v_{b1}(t) = v_{b2}(t - \tau)$$
  

$$v_1(t) = v_{f1}(t) + v_{b1}(t) \qquad v_2(t) = v_{f2}(t) + v_{b2}(t)$$



