1. Write a program that simulates the response (voltage at near and far ends) of a lossless 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: \( t_d = 1 \, \text{ns} \)
- rise time: \( t_r = 1 \, \text{ns} \)
- fall time: \( t_f = 1 \, \text{ns} \)
- pulse width: \( t_w = 20 \, \text{ns} \)
- pulse amplitude: \( V_{\text{max}} = 4 \, \text{volts} \)
Use the following equations:

\[ v_{f1}(t) = \Gamma_1 v_{b2}(t - \tau) + T_1 v_s(t) \]
\[ v_{b2}(t) = \Gamma_2 v_{f1}(t - \tau) \]
\[ v_{f2}(t) = v_{f1}(t - \tau) \]
\[ v_{b1}(t) = v_{b2}(t - \tau) \]
\[ v_1(t) = v_{f1}(t) + v_{b1}(t) \]
\[ v_2(t) = v_{f2}(t) + v_{b2}(t) \]

\[ \tau = \frac{l}{v} \] time delay

\[ \Gamma_1 = \frac{Z_s - Z_o}{Z_s + Z_o} \]
\[ \Gamma_2 = \frac{Z_L - Z_o}{Z_L + Z_o} \]
\[ T_1 = \frac{Z_o}{Z_s + Z_o} \]