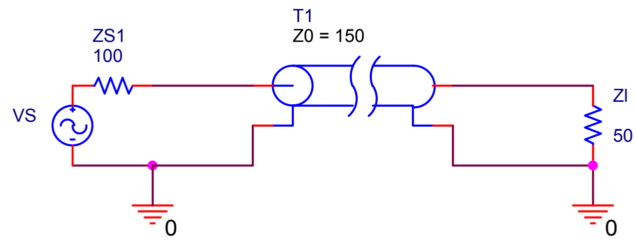
Preparation Assignments:

Due Monday, January 27



For the above circuit, determine the input impedance for the following line lengths, $l =$ $\frac{\lambda}{100}, \frac{\lambda}{8}, \frac{\lambda}{4}, \frac{3\lambda}{8}, \frac{\lambda}{2}, \frac{3\lambda}{4}, \lambda$.

Generally, for what lengths of the transmission line (in wavelengths) is the input impedance a real number?

Generally, for what lengths of the transmission line (in wavelengths) is the input impedance equal to the load impedance?

Due Wednesday, January 29(Tuesday 28)

Determine the attenuation constant, α, spatial frequency, β, and characteristic impedance of a <u>*lossy*</u> transmission line with inductance and capacitance identical to our class RG 58 A/U cables and a resistance, R = 0.008 [Ω/m] for $f = 2$ [MHz].

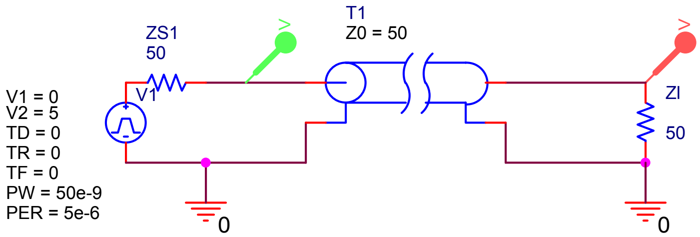
Previously, we have considered our lines to be lossless. Are there significant changes in the spatial frequency, β, and the characteristic impedance, Z_o when resistive losses are added to the transmission line at this frequency?

Due Thursday, January 30

Using a source frequency of 200 [MHz] on a 75 Ω, 2.5E8 [m/s] transmission line with an open circuit load, at what length of the line will it look like a short circuit ($Z_{in} = 0$)?

For this same line, specify the sign of the input impedance for the range of line lengths, $l \in [0,\lambda]$ (in other words, when is the sign negative and when is it positive)?

Due Monday, February 3



The above circuit represents a 50 [ns], 5 [V] pulse sent down a 100 [m], 50 [Ω], 2E8 [m/s] transmission line with matched source and load impedances.

Implement the circuit in PSpice and plot the voltage at the input and output of the transmission line as a function of time. Your plot should include a signal at the input and output; choose your time limits appropriately.

Due Wednesday, February 5(Tuesday 4)

Do the following indefinite integrals:

$\int \frac{1}{r} dr$ (spherical coordinates)

$\int \frac{1}{r} dr$ (cylindrical coordinates)

$\int \cos(\phi)\, d\phi$ (cylindrical coordinates)

$\int \cos(\phi)\, dr$ (cylindrical coordinates)

$\int r^2 dr$ (spherical coordinates)

Do the following definite integrals:

$\int_a^b \frac{1}{r} dr$ (spherical coordinates)

$\int_0^{2\pi} \cos(\phi) d\phi$ (cylindrical coordinates)

$\int_0^{\pi} \sin(\theta) d\theta$ (spherical coordinates)