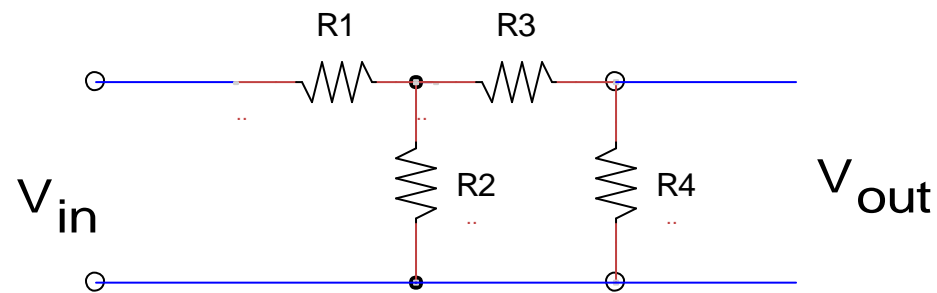


# ASAP 2016

Problem 1. Calculate the transfer function,  $V_{out}/V_{in}$ , for the circuit below. Use the Thevenin. You do not need to simplify the algebra. For example, when you have parallel resistors, just leave them as  $R_x || R_y$



Hint: the result is NOT  $V_{out}/V_{in} = R2/(R1+R2) * R4/(R3+R4)$

## AP207 Bonus Problem - Attenuators

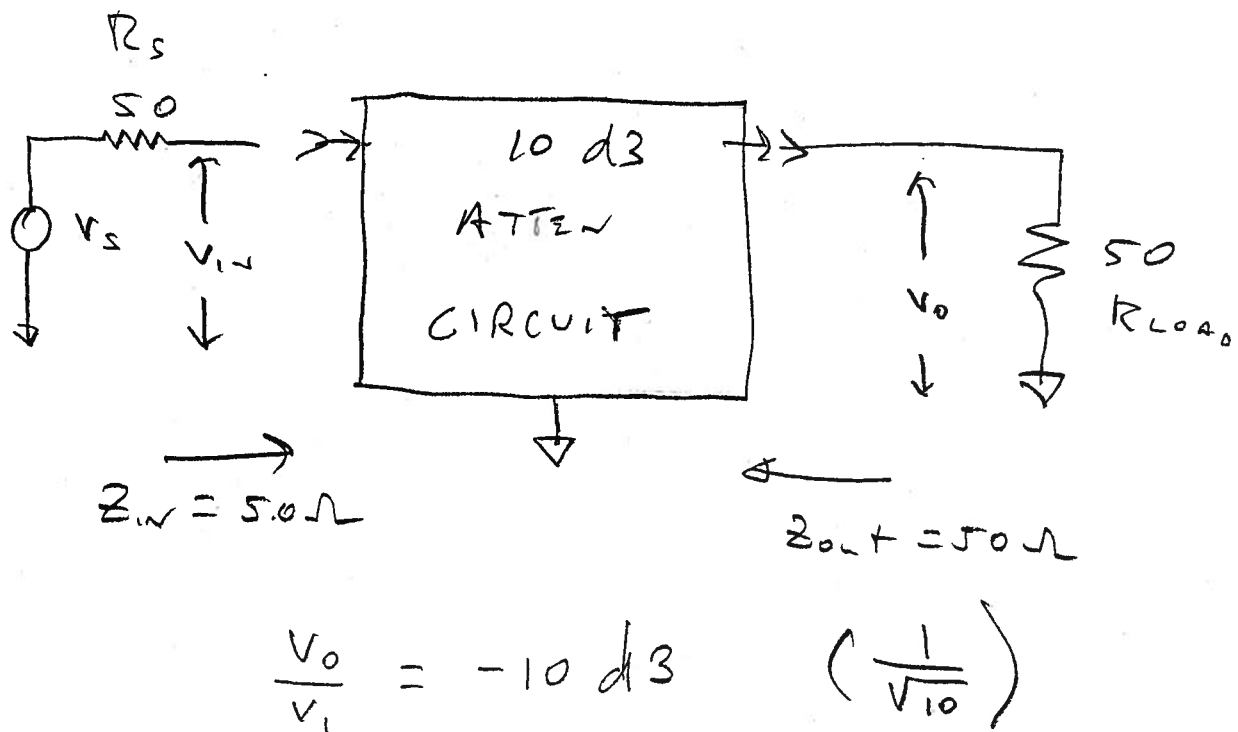
In our first class we learned about voltage dividers, and a bit about input and output impedances of circuits.

The voltage dividers we saw are attenuators, in that the output magnitude is less than the input magnitude, and the attenuation is often specified in Decibels (dB - go look in the text on pages 16 and 17).

The voltage dividers we saw, with two resistors, have input and output impedances that are different. However, for high frequency circuits (RF and microwave circuits) one usually has to design circuits where all the functions have the same input and output impedance (often 50 Ohms). You'll understand why when we study RF circuits (it has to do with transmission lines and signal reflections).

**Can you design a 10 dB RF attenuator with 50 ohm input and output impedances?**

It will look like this in block diagram form:



As another hint - it will take more than two resistors - and if you use three resistors, you will soon see why the two topologies are called "pi" and "T".