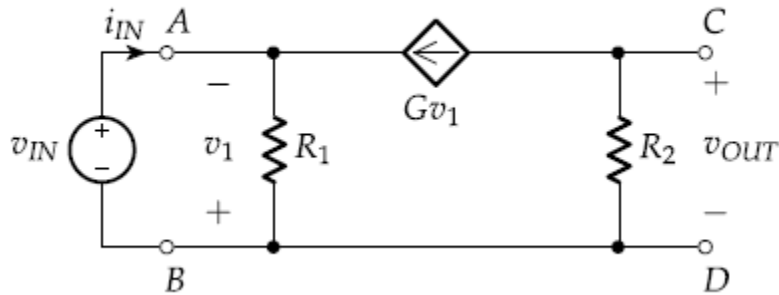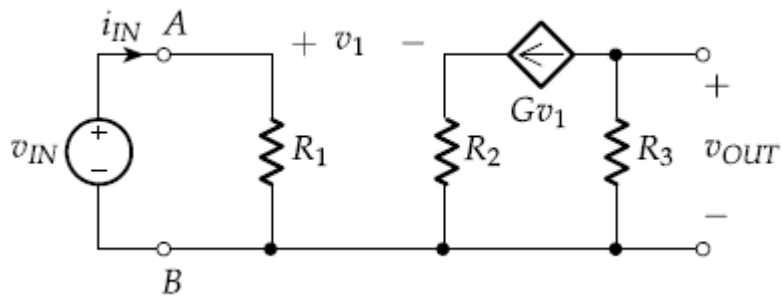# Homework 1 (Summer 2025) Electronics

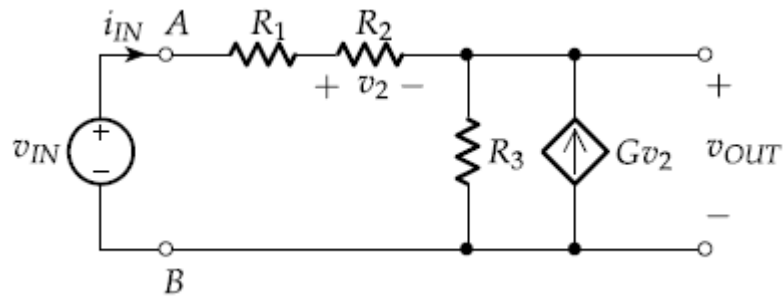1. Find the transfer function for the following circuits
   a) 10 points

   b) 10 points

   c) 10 points

2. A transresistance amplifier with $R_i = 100\ ohm, R_o = 10\ ohm, R_m = 5\ k\ ohm$, is to the connected between a 100 mW source with a resistance of 1k ohm and a load of 1k ohm. What are the values of the current gain i_o/i_i of the voltage gain v_o/v_s and of power gain expressed directly and in decibel. (10 points)

3. A transconductance amplifier with $R_i = 2k\ ohm, G_m = 60\frac{mA}{V}, and\ R_o = 20\ k\ ohm$, is fed with a voltage source having resistance of 1 k ohm, and is loaded with a 1k ohm resistance. Find the voltage gain realized. (10 points)

4. A voltage amplifier with an input resistance of 20 k ohm , and output resistance of 100 ohm and a gain of 1000 V/V is connected between a 100 k ohm source with an open-source voltage of 10 Mv AND 100 ohm load. For this situation:

a) What output voltage results?
b) What is the voltage gain from source to load?
c) What is the voltage gain from amplifier input to the load?
d) If the output voltage across the load is twice that needed and there are signs of internal amplifier overload, suggest the location and value of single resistor that would produce desired output. Choose an arrangement that would cause minimum disruption to an operating circuit. (Hint : use parallel rather than series connections) (20 points)