

PHYS 4211 Instrumentation HW 3

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1. Problem 4.1, Horowitz and Hill, p. 181. Not that it matters for this problem, but for a *pn*p transistor, $V_E - V_B \simeq 0.6\text{ V}$, the opposite for the *np*n transistor you are more familiar with.

2. Write down the two simultaneous equations in x and y that the analog computer circuit in the figure is set up to solve. ($R = 1\text{ M}\Omega$.) The ratios in the figure refer to voltages at those points. For example $-\frac{c_1}{a_1}$ is the voltage measured at the left right hand side potentiometer and applied to one side of the $1\text{ M}\Omega$ resistor. This circuit is less complicated than it might seem at first blush. You built a subset of it in lab!

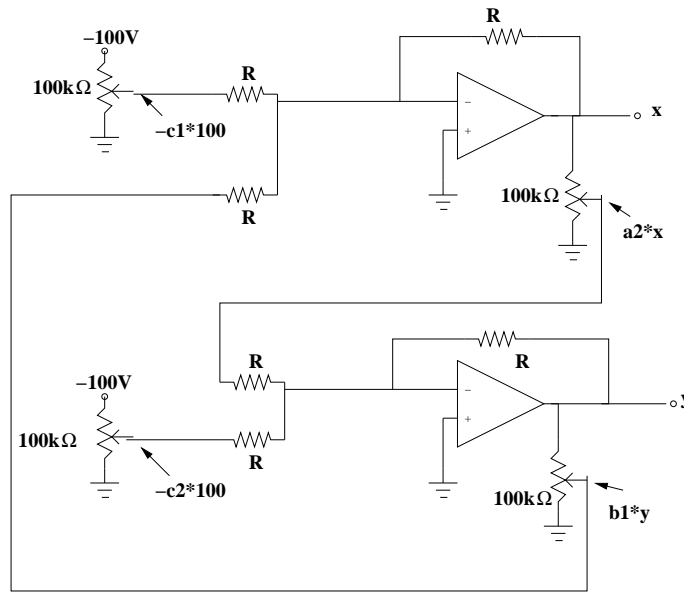


Figure 1: Analog computer circuit that solves for x and y .

3. Using our op-amp golden rules, explicitly derive the result for V_{out} shown in Figure 4.18 in Horowitz and Hill, p185.