

PHYS 4211 Instrumentation HW 3

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1. Problem 4.1, Horowitz and Hill, p. 181. (This is the circuit in part B of the figure.) Not that it matters for this problem, but for a *pnp* transistor, $V_E - V_B \simeq 0.6\text{V}$, the opposite for the *npn* transistor you are more familiar with. **Show your work** and simplify your results as much as possible.

2. Write down the two simultaneous equations in x and y that the analog computer circuit in the figure is set up to solve. ($R = 1\text{M}\Omega$.) Voltages at the pots are indicated, with the letter indicating the fraction of the maximum possible voltage. This circuit is less complicated than it might seem at first blush. You built a subset of it in lab! **Show your work.**

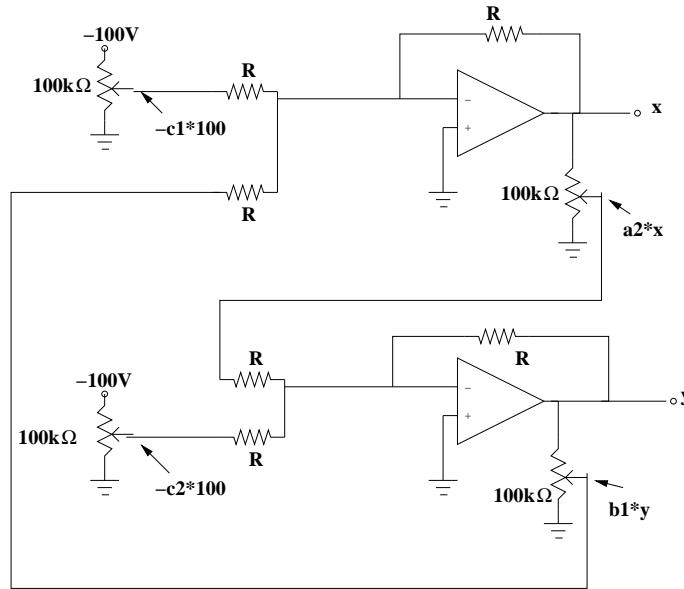


Figure 1: Analog computer circuit that solves for x and y .

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