Jason worked with Davie & Julian today.

Today we worked with opp amps, and we learned how to use the pins. The approximations we made were very accurate but they were all linear so we don't necessarily know how reliable of a tool they would be when you're working with ac. One of the main problems we had to overcome was when we needed to provide two voltage inputs for the adder. The solution given on the board was flawed because it was connected to ground which gave the other voltage input a path to ground. In order to overcome this we left our voltage divider untouched and increased the resistance of everything else so that the current would take the path to ground as much. Even with 16K resistors this worked like a charm. The last interesting thing we discovered was the way you could construct a non-inverting amplifier by connecting the negative end with a path to the ground. Our approximation worked really well and had very low errors for all of our measurements but unfortunately the theoretical approximation was a bit off (Vout = 3*Vin versus Vout = 3.617*Vin). The interesting question that was brought up by this lab was whether the inputs to the amplifier must always be at the same potential when in equilibrium. After a quick google search and some reading, it turns out the answer is yes, and not just for non-inverting op-amps. Turns out this is called a "virtual short circuit" because even though they are not connected together the noninverting and inverting inputs settle when "they have almost the same voltage" (Toshiba Electronics).

Citation:

"What Is the Virtual Short-Circuit (Virtual Ground) of an Op-Amp?: Toshiba Electronic Devices & Storage Corporation: Americas – United States." *Toshiba Electronic Devices & Storage Corporation | Americas – United States*, toshiba.semicon-storage.com/us/semiconductor/knowledge/faq/linear_opamp/what-is-the-virtual-short-of-an-op-amp.html#:~:text=A%20virtual%20short%2Dcircuit%20(or,have%20almost%20the%20same%20voltage. Accessed 4 Mar. 2025.