Your assignment is to create a functional 8-bit ripple-carry adder in Logisim, in a file called `adder.circ`. It will do the following:

- Receive two 8-bit integers as input on the west side.
- Output their sum as an 8-bit integer on the east side.
- Also output a 1-bit overflow flag on the east side, that will output “true” if the sum overflowed (using signed-arithmetic rules), and “false” otherwise.

Start by downloading the pre-made circuit for this assignment. This “dummy-adder” uses Logisim’s built-in adder for the addition, and always sets the overflow to on (regardless of input). You will make a brand new circuit to go in its place. When finished, you should be able to just delete the old circuit (labeled “Your chip goes here”) and drag yours into its place.

The best way to do this is to start by creating a single-bit full-adder circuit, and then use 8 of these as part of the ripple-carry adder. Don’t use any of Logisim’s built-in arithmetic chips.

For overflow, there are two tasks you can take. You can test the sign bits as we have done before (i.e. testing if 2 positives add to a negative, or 2 negatives add to a positive), or you can simply XOR the carry-in and carry-out of the most significant full-adder.

**Extra Credit:** A modest amount of extra credit will be given if you create an additional 1-bit input on the north side. When this input is on the circuit will subtract the numbers rather than add them.