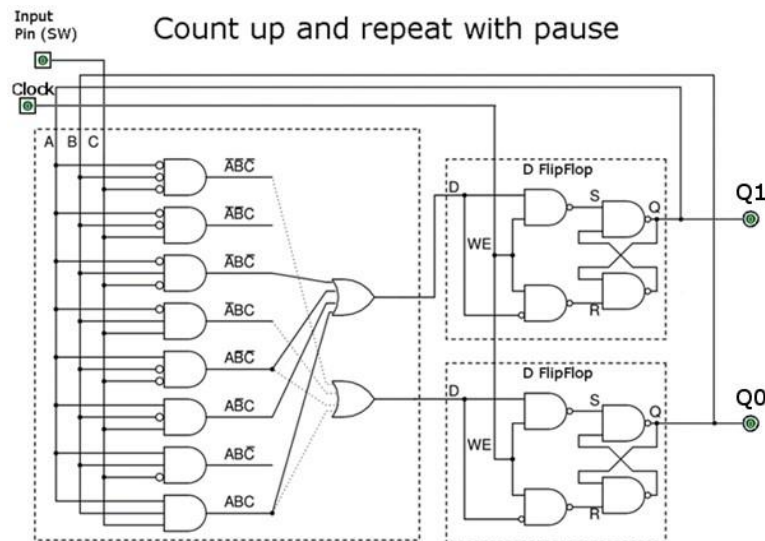# State Machine Assignment.

Create three different state machines as described below and upload to WebCAT.

1. Create the circuit above in Logisim.
   a. Name the file ***count_up_with_pause.circ***.
   b. Use only pins, or-gates, splitters, decoders, and D-Latches (D Flip-Flops). Use the build in Decoder and D Flip-Flop (D-Latch). Do not create your own.
   c. You **MUST** label your input and output pins. Use the labels SW, Clock, Q1, Q0.
   d. NOTE that instead of an actual clock, you are to use an input pin with the label Clock.
   e. NOTE that all input pins must be east facing and be in the order shown top to bottom. SW and the Clock are both inputs.
   f. NOTE that all output pins must be west facing (Q1 and Q0) and be in the order

   shown top to bottom.
   g. Leave the circuit name as main.
   h. The clock input (write enable) to a D-Latch looks like a greater than symbol (>).
   i. Create, test, and submit to Web-CAT as Part 1 of this assignment.

2. Create another state machine that counts up and repeats if the switch value is 0 and flashes both on – both off if the switch value is 1. When switching from a count state to a flashing state, all transitions should be to the 00 state (Ask if you don't understand).
   a. The same rules from part 1 apply to this part also.

b. Name the file ***count_up_repeat_flash_both.circ***.

c. Note that you only really have to change the connections between the decoder and the or-gates.

d. Create, test, and submit to Web-CAT as Part 2 of this assignment.

3. Create another state machine that counts up and stops at 11 if the switch value is 1 and resets to 00 if the switch is in 0. That is all states should lead to the 00 state if the switch is in the 0 position.

   a. The same rules from part 1 apply to this part also.

   b. Name the file ***reset_count_up_stop.circ***.

   c. Note that you only really have to change the connections between the decoder and the or-gates.

   d. Create, test, and submit to Web-CAT as Part 3 of this assignment.

Test your circuit before submitting. For part 1, make sure your circuit counts up and repeats when SW is zero like this: 00, 01,10, 11, 00, 01, …

When in state 00, change SW to 1 and click the clock several times. The state should remain 00. Change SW back to zero. Click the clock twice. It should change to state 01. Change SW back to 1 and click the clock several times. The circuit should stay in state 01. Test ALL four states with both transitions.

Test part 2 and part 3 just as thoroughly. You should KNOW your circuit is doing the correct thing before submitting. If you don't know what the correct thing is, then that will be a problem.

THINGS TO CHECK IF YOUR CIRCUIT IT ISN'T WORKING

Recheck the connections between your decoder and your OR gates. It is easy to get them switched or misconnected.

Make sure you don't have any "accidental" connections between wires.

Make sure you have the splitter that feeds the decoder select pins wired correctly. The switch should connect to the low bit (the one labeled 0) and Q1 should connect to the high bit (labeled 2) leaving Q0 to the middle bit (labeled 1).

The position and direction of the pins are vitally important for fitting your circuit into my test circuit. Make sure the Clock pin is below the SW pin.

CHECK YOUR CIRCUIT APPEARANCE BEFORE UPLOADING TO WEB-CAT!

Click on Project->Edit Circuit Appearance and you should see something like this with orderly square input pins on the left side of the image and orderly round output pins on the right side of the image. There may be more or fewer pins than shown depending on the assignment.

DO NOT MODIFY ANYTHING IN THIS VIEW!!!
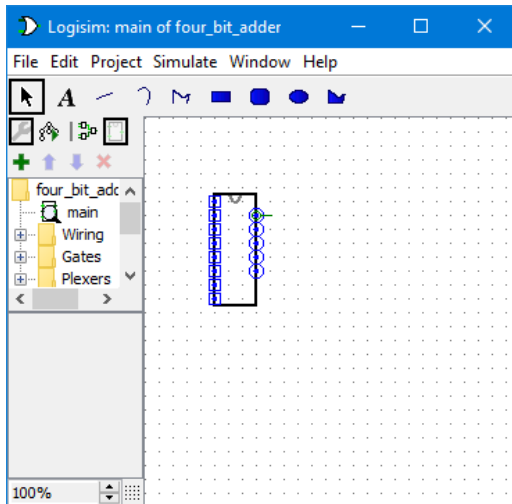
If you see a jumbled mess of pins will fail the tests on Web-CAT.

Here is an example of a bad circuit appearance.