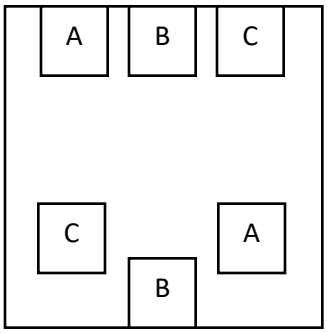
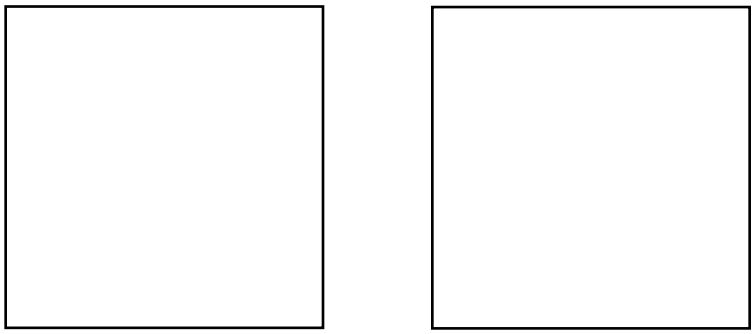
Three Strange Machines

Today's work is in covering problem-solving strategies by learning to examine a system: in this case, three unusual machines.[1]

1. Below is a circuit board. The rules of the problem are as follows:
   a. Connect A to A, B to B, and C to C.
   b. No wire can cross another wire, or go outside of the square.



First try drawing two circuit boards that would be simpler to solve, using the same rules:



In words, the simplifications you tried were:

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Strategies for solving this kind of problem:

[1] These problems are borrowed courtesy of Paul Zeitz via Joshua Zucker.

2. The next machine takes **integers** and outputs **integers**. We will try to find the pattern.

X	y	output

x	Y	output

Write a pattern you see in the results:

Write a guess for the rule based on the pattern you see:

Write a series of outputs you can use to test your pattern, and the expected results:

3. On the last page, we found that the output for any x and y was **x + xy + y**. Now, suppose that we had a deck of cards numbered 1 through 100. We can give them to our second machine to get a series of outputs.

   In the space below and on a separate sheet of paper if you run out of space, write a list of some things that you **notice** and some things that you **wonder** about the outputs from this machine:

   Notice: How to investigate:

   Wonder: How to investigate:

   Results which we found as a class: