



Figure 5.2: Controller for a GCD machine.

must be connected. If we view the arrows as wires and the X buttons as switches, the data-path diagram is very like the wiring diagram for a machine that could be constructed from electrical components.

In order for the data paths to actually compute GCDs, the buttons must be pushed in the correct sequence. We will describe this sequence in terms of a controller diagram, as illustrated in [Figure 5.2](#). The elements of the controller diagram indicate how the data-path components should be operated. The rectangular boxes in the controller diagram identify data-path buttons to be pushed, and the arrows describe the sequencing from one step to the next. The diamond in the diagram represents a decision. One of the two sequencing arrows will be followed, depending on the value of the data-path test identified in the diamond. We can interpret the controller in terms of a physical analogy: Think of the diagram as a maze in which a marble is rolling. When the marble rolls into a box, it pushes the data-path button that is named by the box. When the marble rolls into a decision node (such as the test for