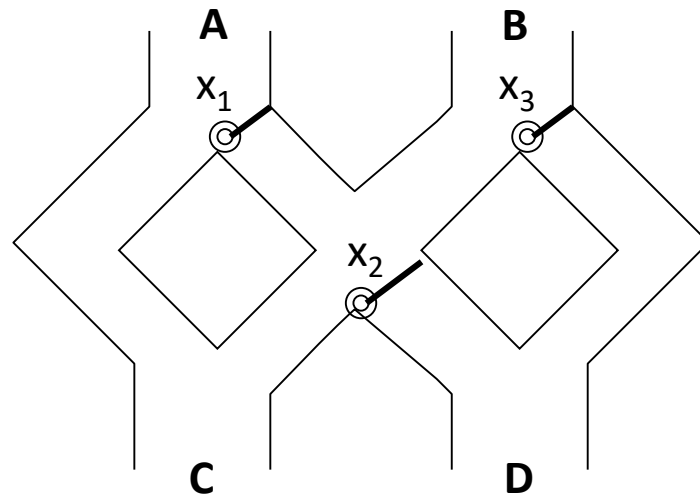


# Theory of Computation

Game of Marbles

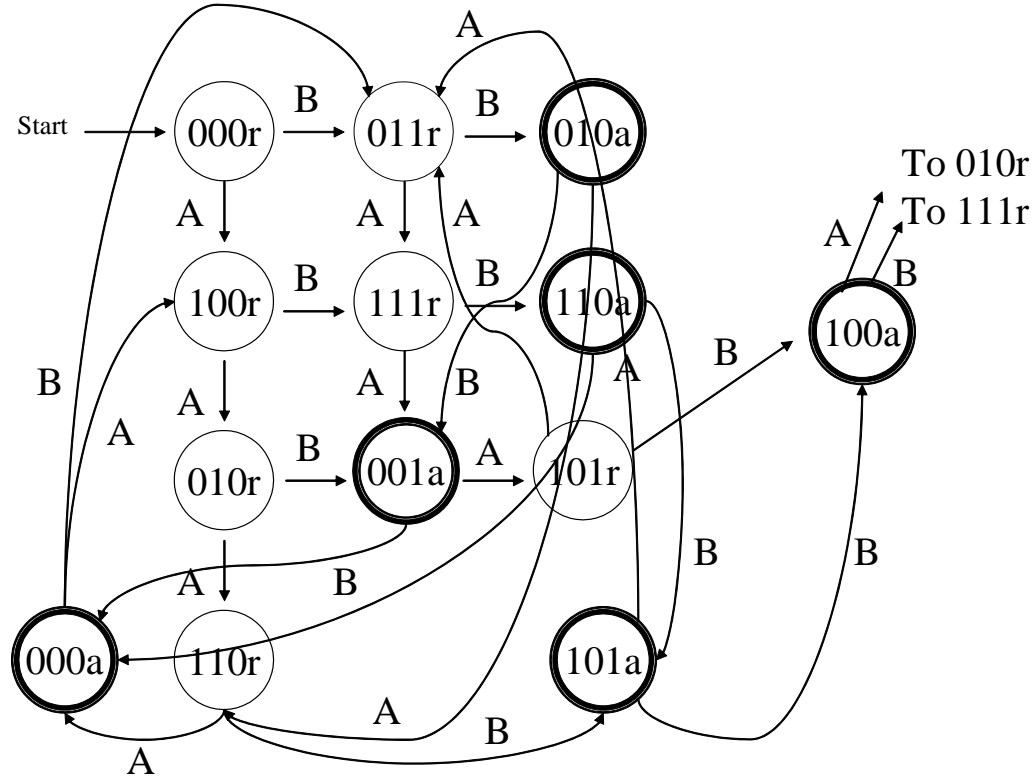
# Example

- ▶ Consider the toy shown on the right
- ▶ Game of Marbles
  - ▶ A marble is dropped in at A or B
  - ▶ Levers X1, X2, and X3 cause the marble to fall either to the left or right
  - ▶ Whenever a marble encounters a lever, it causes the lever to change state, so that the next marble to encounter the lever will take the opposite branch
  - ▶ Model this toy by a finite automaton (FA)
  - ▶ A sequence of inputs is accepted if the last marble comes out at D



Source: John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman. *“Introduction to automata theory, languages and computation”*. 2nd ed, Addison-Wesley, 2001.

# DFA – State Diagram



# DFA – Transition Table

	A	B
->000r	100r	011r
*000a	100r	011r
*001a	101r	000a
010r	110r	001a
*010a	110r	001a
011r	111r	010a
100r	010r	111r
*100a	010r	111r
101r	011r	100a
*101a	011r	100a
110r	000a	101a
*110a	000a	101a
111r	001a	110a