A finite state machine, so names because the sequential logic or flip-flops that implements them can be in one of a finite number of possible states. In lab 6 option A, you will implement a simple vending machine to dispense after dinner at a restaurant Snickers Ice Cream Bar, a perfect combination of soft, creamy ice cream, milk chocolate, some caramel, and just enough peanuts.

**Original Vending Machine**
The vending machine delivers an ice cream bar after it has received 15 cents in coins. The machine has a single coin slot that accepts only nickels and dimes, one coin at a time. A mechanical sensor indicates whether a dime or a nickel has been inserted into the coin slot. The controller’s output causes one ice cream bar to be released down a chute to the charitable donor. The donor may insert three nickels, a dime and a nickel, or two nickels and a dime or two dimes. If the donor inserts a total of 20 cents, the machine keeps the extra 5 cents as an additional charitable donation.

Suitable Abstract Representation
I. Tabulate typical input sequences:
   - 3 nickels
   - nickel, dime
   - dime, nickel
   - two dimes
II. Draw state diagram:
   - Inputs: N, D, reset
   - Output: open chute
III. Assumptions:
   - Assume N and D asserted for one cycle.
   - Each state has a self loop for N = D = 0 (no coin)
**Revised Vending Machine**

After demonstrating the logic of this machine to the instructor, it was deemed impractical to keep the extra nickel of change for the Dime-Dime-Nickel and Nickel-Nickel-Dime scenario listed above. Too many users were annoyed that the extra nickel was kept as an extra donation. Therefore, a second output called Change is to return one Nickel in the above two scenarios. Add a state called *TwentyCents* that dispenses the ice cream bar and returns a nickels change.

**Final Report, using the same format of previous lab reports, is to include at a minimum the following:**

- Original Vending Machine State Diagram
- Original Vending Machine Transition Table
- Original Vending Machine K-Maps
- Original Vending Machine Circuit Diagram
- Revised Vending Machine State Diagram
- Revised Vending Machine Transition Table
- Revised Vending Machine K-Maps
- Revised Vending Machine Circuit Diagram

In addition to completing the final report, you need to demonstrate the correct operation of the breadboarded (original version) vending machine controller to the instructor.