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Project Proposal: Vending Machine DFA

A Deterministic Finite Automata (DFA) is a diagram with a finite number of states represented by circles. An arrow points to the start state, which is unique from the other states. The double circles mark any number of the states as accepting states. For every state, for every symbol in Σ , there is exactly one arrow labeled with that symbol going to another state, or back to the same state.

My proposal for my project is to create a DFA on a vending machine and the way it works and operates. The scenario would be that the vending machine accepts one (1) and two (2) dollar coins. The vending machine would refund all of the money inputted if more than four (4) dollars. Also, the machine would be ready to deliver if exactly four (4) dollars has been added.

The starting state would be zero (0) dollars, indicated by the beginning arrow. The alphabet for this SFA would be $\Sigma = \{1,2\}$. This is due to the number of coins you can add to the machine to create a certain dollar amount. For example, if you add 2 two (2) dollar coins, you would result in the machine holding four (4) dollars for your transaction. Another example is if you start with one (dollar) coin, and you add one two (2) dollar coin, you would be left with three (3) dollars in the vending machine towards your transaction. The double circled state would be the four (4) dollar state, which is where it would end.

I believe this would be a good project to do a DFA diagram on, because it is easy relatable to everyday life and it can be expanded upon, like adding the limit of the amount of money the vending machine can take, the types of coins or bills you can input into the machine, etcetera.