This homework gauges your ability to use more advanced state modeling. Also, note that you may be required to create diagram and model elements not named in this assignment. You can name them yourself, but please use the names of any classes specified in this assignment as they are written. *Use concepts of good style and object-oriented design (as much as you know them) when you complete this assignment.*

Since this assignment requires only document submission, you should put all your answers in a single Word file, or PDF, which is in the root of your hw04-\textit{lastname} directory.

1 **Coffee, anyone?**

Using the description of the coffee machine from the previous homework, implement a state model that follows your design, or another design that you submit with your submission on this question*. Please include the design that you referenced—along with the person who did the design—in an appropriately named section (and in your printed submission) for this homework, regardless of whether it is your own design, or someone else’s, from the previous homework. You will be judged on the completeness of your design, and the consistency with your interaction models.

2 **Put...zee candle...beck...**

This problem is based on (but not identical to) #5.11 from p.109 of the textbook.

While exploring an old castle, you and a friend discovered a bookcase that you suspected to be the entrance to a secret passageway. While you examined the bookcase, your friend removed a candle from its holder on the mantelpiece (a short reach away), only to discover that the candle holder was the entrance control. The bookcase rotated a half turn, pushing you along, separating you from your friend and stopped. Your friend put the candle back. This time the bookcase rotated a full turn, still leaving you behind it, and then stopped.

Your friend took the candle out. The bookcase rotated a full turn again, and came to a stop. Your friend put the candle back. As the bookcase began to rotate, your friend quickly took out the candle: although the bookcase initially continued turning, it stopped after a quarter turn. You and your friend then entered to explore further. After you finished your exploration, you returned to the outside of the bookcase and remarked that it had been exactly 2 hours since you entered the secret passage. At this moment, the bookcase turned and closed, thus appearing just as it had before your friend touched the candle.

Prepare a state diagram which is consistent with this description; full credit will be given to designs that permit this behavior with very few states and transitions. You may use any names you like for any states, events, guards, and actions you create.

*To be clear, this exception to the academic integrity policy says that you are permitted to share your submission from the previous homework with a classmate, but you are not permitted to share any work for this assignment.*
3 Dance Revolution-Revolution

You are designing a monitor for an electronic dance game. Players are expected to step in time to certain musical selections, and their proximity to the beat, along with correctness, generates an event which is sent to you. You can receive the following events, each of which is valued by the number out to the side:

- perfectStep (+2)
- greatStep (+1)
- okayStep (0)
- shakyStep (-1)
- dangerousStep (-2)
- badStep (-3)

Your goal is to give the dancer an indication of how she is doing. There are five classifications for the current state of the dancer, from best-to-worst, and a final state which indicates that the game is over:

- Perfect (+2)
- Great (+1)
- Okay (0)
- Shaky (-1)
- Dangerous (-2)
- GameOver (-3)

The dancer always begins as Okay. To improve to the next level, 5 events in a row of any step which is better than the current classification are required (note the classification names and event names). All five events do not have to be identical, but none of the five can be of the current state or “less”; for example, if in Dangerous, then an event stream of okayStep, perfectStep, okayStep, greatStep, greatStep will increase the classification. The player will decrease one level if any two events in a row are less than the current state’s value. When the state GameOver is entered, the program exits; otherwise, play continues indefinitely.

Prepare a state diagram which is consistent with this description. Full credit will be given to elegant designs with relatively few states and transitions. You may use any names you like for any states, events, guards, and actions you create. Explain the behavior of any in-state activities you define.