Link to the Problog Code (attached in submission)

System Modeling Explanation:

The above Problog code models a simple smart home diagnosis system. The smart home is built using six components: Living Room Motion Sensor, Hallway Motion Sensor, Light Sensors, Temperature Sensors, Thermostat, and Power Supply. Each of these components has its own probability of failure: 0.05, 0.05, 0.02, 0.03, 0.01, and 0.01 respectively. There are also a variety of different normal conditions that do not constitute a device failure such as movement in the living room or hallway and the light switch being on. These conditions have probabilities of 0.9, 0.85, and 0.95, respectively. A set of rules for deriving observations are then constructed based on the previously defined facts. Finally, different sets of evidence are modeled and queried with the results shown below.

Sample Queries & Outputs:

Evidence 1

```
% Evidences at time 1
evidence(motion_detected(living_room), false).
evidence(light_on, false).
```

Query ▼	Location	Probability
faulty_light_sensor	39:7	0.28985507
faulty_motion_sensor(hallway)	38:7	0.05
faulty_motion_sensor(living_room)	37:7	0.34482759
faulty_thermostat	41:7	0.01
power_failure	40:7	0.01

Evidence 2

```
% Evidences at time 2
evidence(motion_detected(living_room), true).
evidence(light_on, true).
```

Query ▼	Location	Probability
faulty_light_sensor	39:7	0
faulty_motion_sensor(hallway)	38:7	0.05
faulty_motion_sensor(living_room)	37:7	0
faulty_thermostat	41:7	0.01
power_failure	40:7	0.01

Interpretation of Query

After running the same queries with different evidence for motion detected or light state, it was clear that the probabilities were affected. When we ran the queries on the systems with no motion detected and the lights off, the chance of faulty motion sensors was significantly greater than when running the same queries with different evidence. This occurs due to the section of the code that modifies probabilities based on other sensors in the system. As seen in our differing results with different sets of evidence, it is clear that adjusting the prior probabilities will affect the results of our inferences.