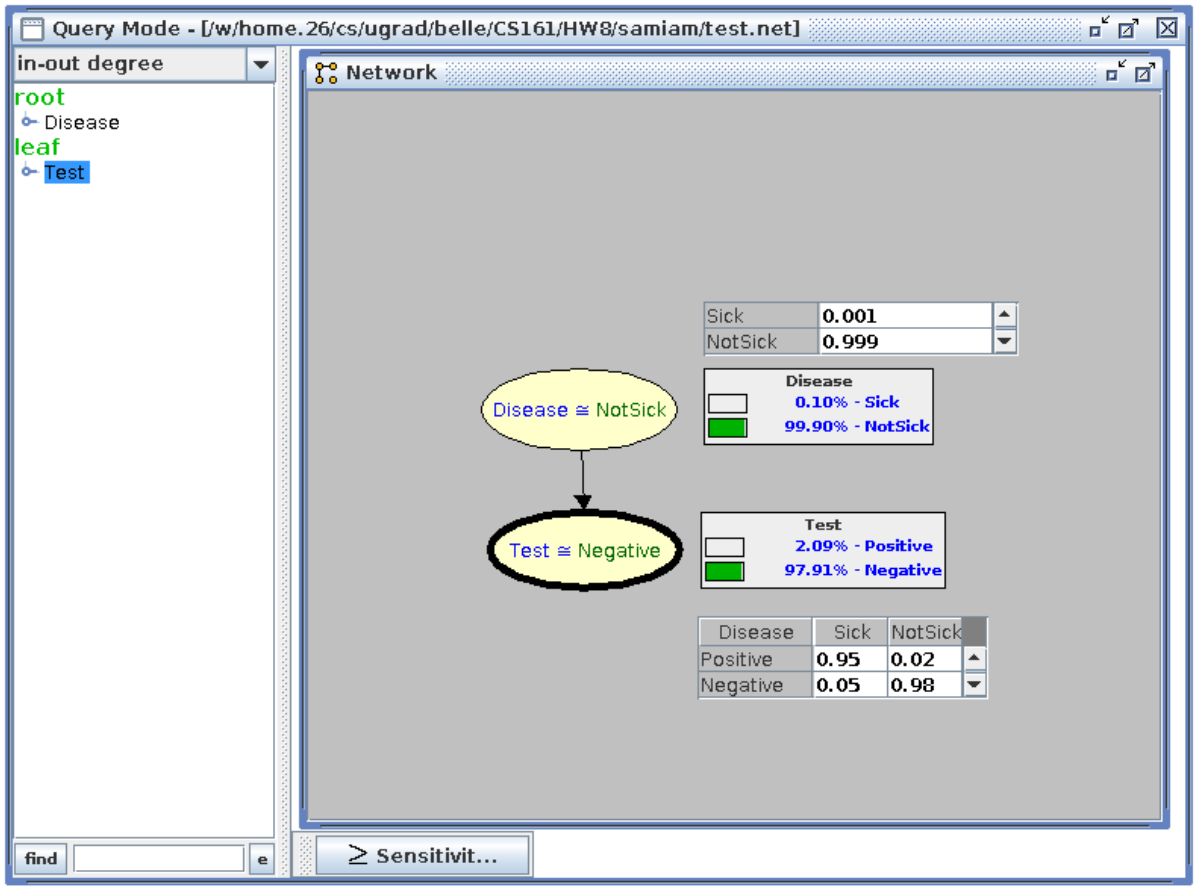
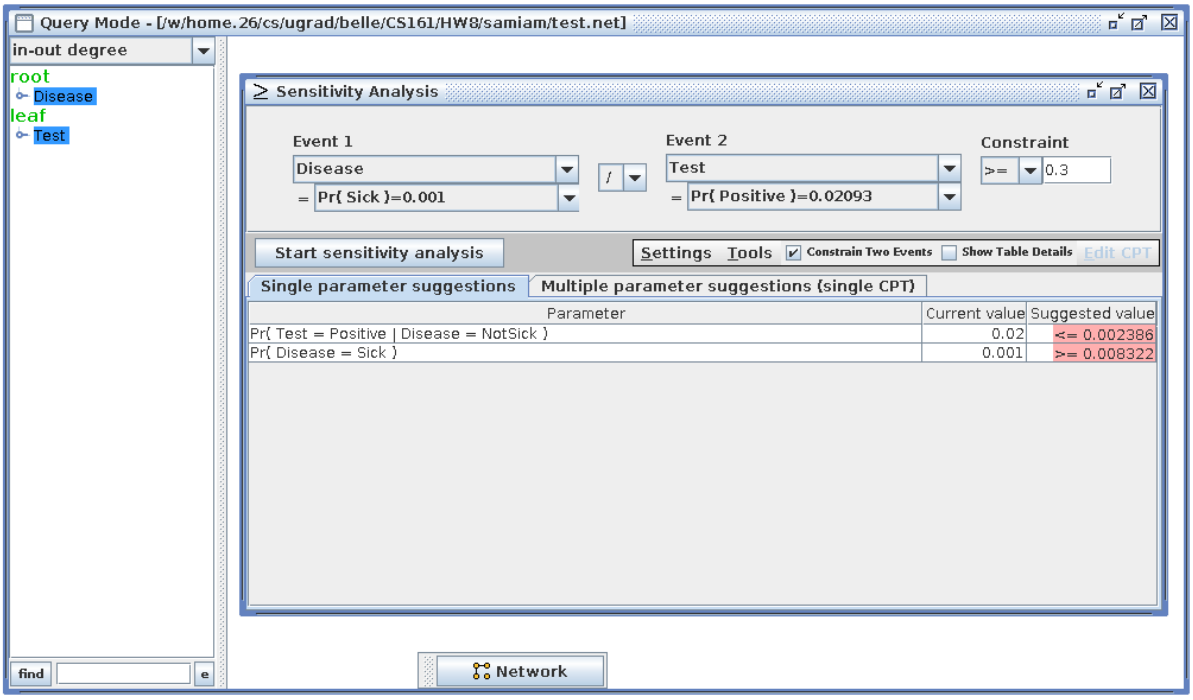
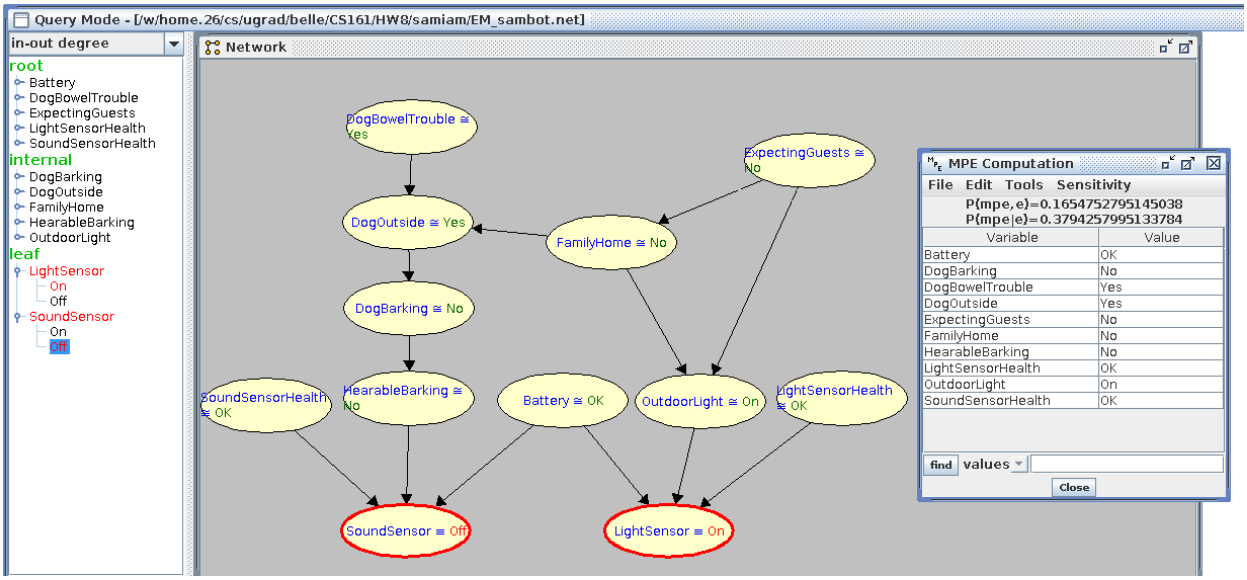
1.


Query Mode - [/w/home.26/cs/ugrad/belle/CS161/HW8/samiam/test.net]
in-out degree
root
Disease
leaf
Test
find
e
Network
Sick 0.001
NotSick 0.999
Disease ≅ NotSick
Disease
0.10% - Sick
99.90% - NotSick
Test ≅ Negative
Test
2.09% - Positive
97.91% - Negative
Disease Sick NotSick
Positive 0.95 0.02
Negative 0.05 0.98
≥ Sensitivit...


Query Mode - [/w/home.26/cs/ugrad/belle/CS161/HW8/samiam/test.net]
in-out degree
root
Disease
leaf
Test
find
e
≥ Sensitivity Analysis
Event 1
Disease
= Pr(Sick)=0.001
/
Event 2
Test
= Pr(Positive)=0.02093
Constraint
>= 0.3
Start sensitivity analysis
Settings Tools Constrain Two Events Show Table Details Edit CPT
Single parameter suggestions
Multiple parameter suggestions (single CPT)
Parameter Current value Suggested value
Pr(Test = Positive | Disease = NotSick) 0.02 <= 0.002386
Pr(Disease = Sick) 0.001 >= 0.008322
Network

The constraint for the probability of having the disease is Pr(Sick) >= 0.008322. The constraint for the false positive is Pr(Positive | NotSick) = 0.002386. Lastly, there's no constraint for the false positive because changing this probability by itself has no effect on Pr(D|T).

2. a)

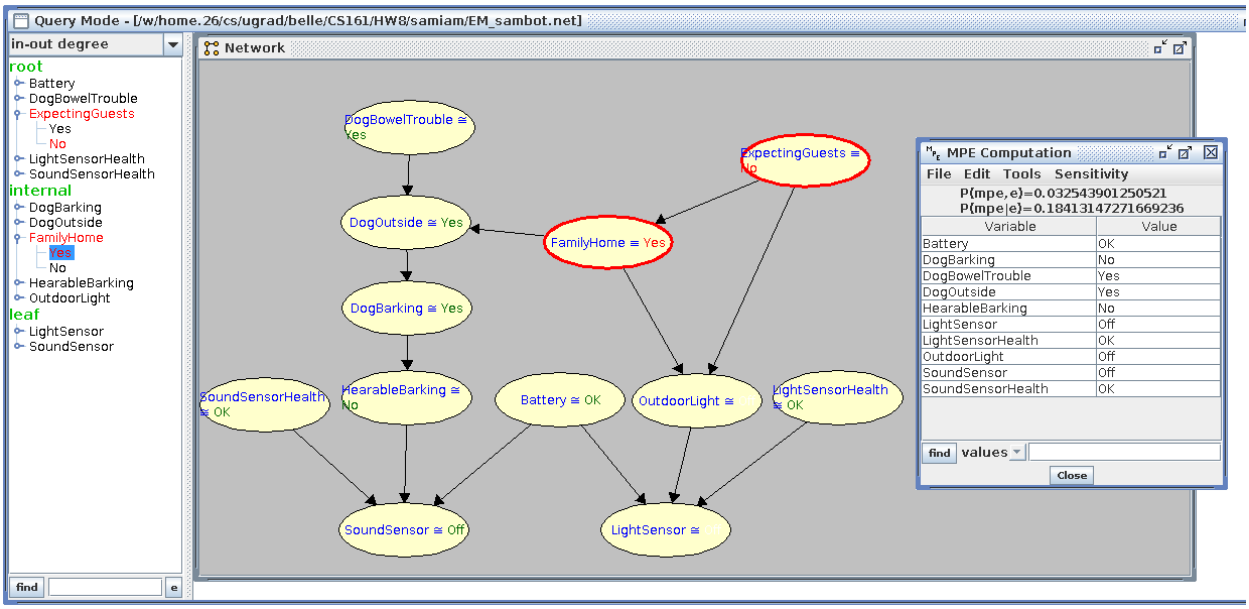


Instantiation:
Battery — OK
DogBarking — No
DogBowelTrouble — Yes
DogOutside — Yes
ExpectingGuests — No
FamilyHome — No
HearableBarking — No
LightSensorHealth — OK
OutdoorLight — On
SoundSensorHealth — OK

Steps:

1. First I changed to Query Mode
2. I clicked the dropdown for LightSensor and SoundSensor on the left sidebar
3. For LightSensor, I clicked On and then for SoundSensor, I clicked Off
4. Then I clicked on the MPE

b)



Instantiations:
SoundSensor — Off
LightSensor — Off

Steps:

1. I unclicked On and Off for LightSensor and SoundSensor on the left sidebar
2. Then I clicked the dropdown for FamilyHome and ExpectingGuests
3. For FamilyHome, I clicked Yes and then for ExpectingGuests, I clicked No
4. Then I clicked on the MPE

c) One smallest set of variables **Z** such that the two sensors are independent could be {Battery, FamilyHome}. There are basically 2 paths between Sound Sensor and Light Sensor. Each path passes through either Battery or FamilyHome, both of which are divergent values. Given **Z**, the 2 paths would be blocked and the two nodes would be independent.

d) The network is multiply-connected as we can see from the FamilyHome, ExpectingGuests, and OutdoorLight nodes. There's more than 1 path from ExpectingGuests to OutdoorLight.