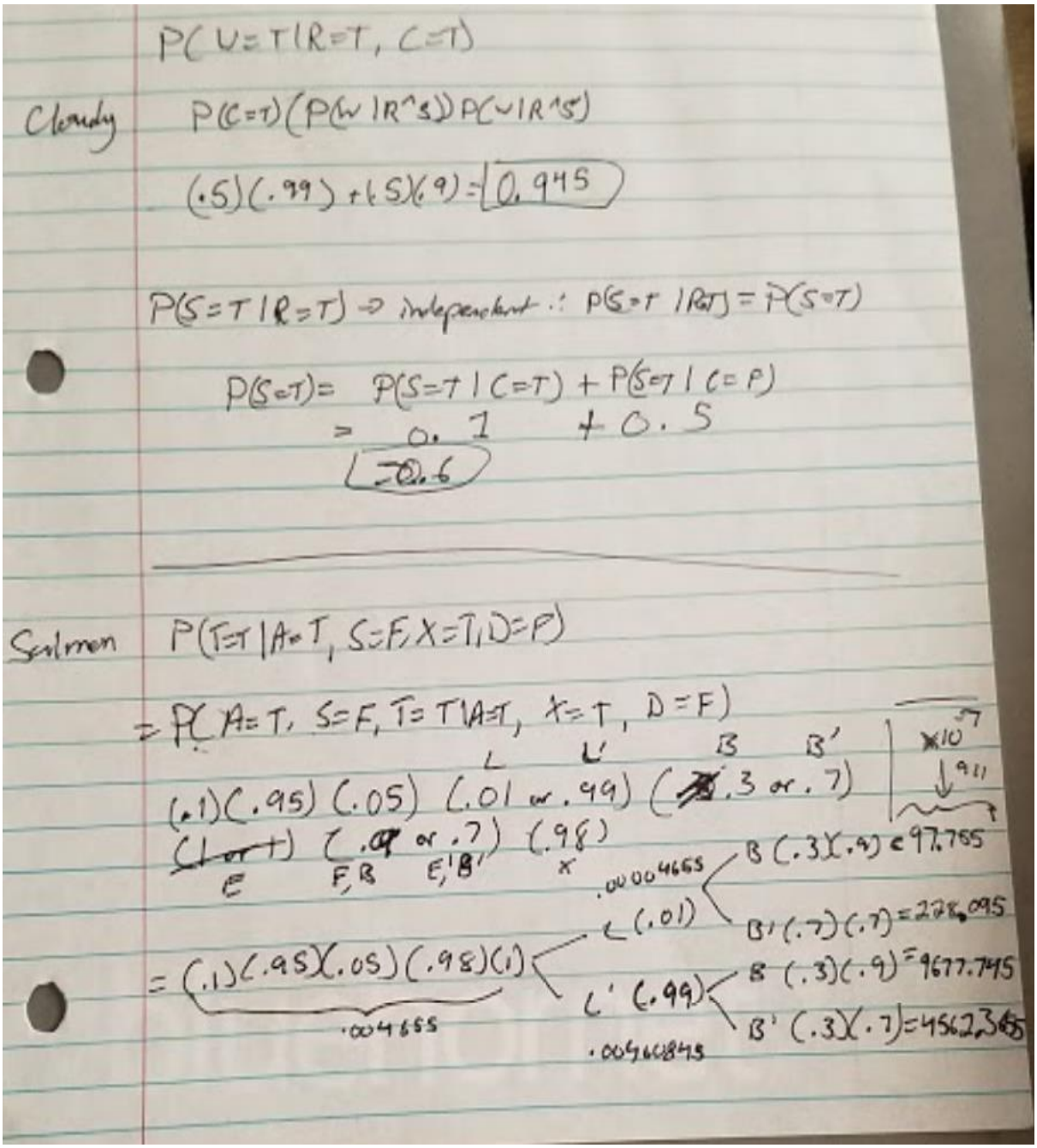
Amit Nijjar

A11489111

CSE 150

Assignment 4 Report

Problem 1 and 2 and 4 on paper



Algorithms

Rejection Sampling:

Rejection sampling is an approximate algorithm in a bayes network. You average the values of multiple iterations of the network and normalize it to get the probability. Using random numbers, I was able to create the multiple paths used to approximate the probability.

Likelihood sampling:

Like rejection sampling, likelihood sampling is another approximate algorithm in bayes network. I normalized the total sum of valued samples similarly to the end of rejection sampling.

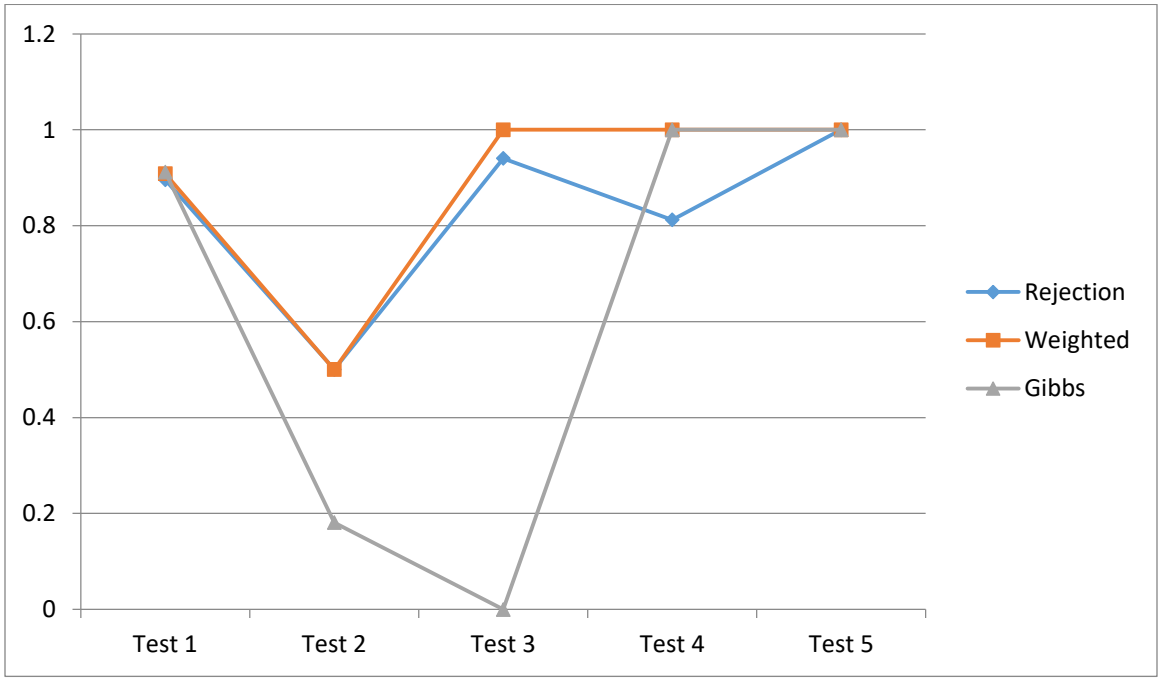
Gibbs Sampling:

Gibbs sampling is based off of the markov blanket. I set a value based on the markov blanket of a node and then return the probability based off of the markov blanket values. Then I normalize the probability in the end.

Problem 3

Test 1(Rain = true, Cloudy = true)
rejection sampling: 0.895793131607
weighted sampling: 0.908168163363
gibbs sampling: 0.911533230665
Test 2 (Rain = true)
weighted sampling: 0.500176153606
rejection sampling: 0.500441082041
gibbs sampling: 0.180966952672
Test 3 (rain = true, cloudy = true, sprinkler = true, wetgrass = true)
weighted sampling: 1.0
rejection sampling: 0.940168510839
gibbs sampling: (0, 0)
Test 4 (sprinkler = true, wetgrass = true)
weighted sampling: 1.0

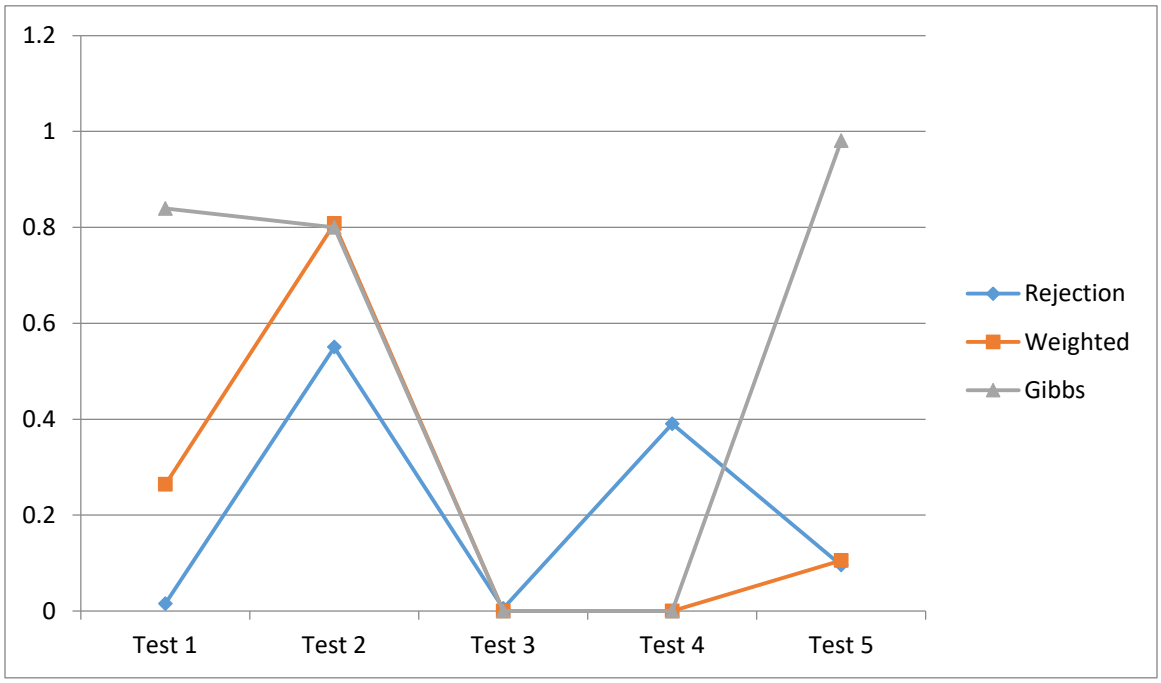
rejection sampling: 0.812122062294
gibbs sampling: 1.0
Test 5 (wetgrass = true)
weighted sampling: 1.0
rejection sampling: 1.0
gibbs sampling: 1.0



I found that 5 trials were needed to give an estimate close to the actual probability.

Test 1 (Asia = true, smoker = false, xray = true, dispnea = false)
rejection sampling: 0.0154255027442
weighted sampling: 0.263697526697
gibbs sampling: 0.839386787736
Test 2 (asia = true, smoker = false, bronchitis = true)

rejection sampling: 0.549948582877
weighted sampling: 0.807426148523
gibbs sampling: 0.79981799636
Test 3 (asia = true, smoker = true, tb_or_cancer = false, bronchitis = true)
rejection sampling: 0.00545867713872
weighted sampling: 0.0
gibbs sampling: 0.0
Test 4 (asia = true, smoker = false, xray = true, dispnea = false, bronchitis = true, tb = false)
rejection sampling: 0.390104653161
weighted sampling: 0.0
gibbs sampling: 0.0
Test 5 (asia = true, smoker = false, bronchitis = true)
rejection sampling: 0.0956084862684
weighted sampling: 0.105282105642
gibbs sampling: 0.980419608392



I did this project solo.