

# CIS 579: PA - 2 Report

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Below are the tables displaying the results after executing each sampling algorithm 10 times and calculating the average inferred probabilities for all test queries.

## Table for Case 1:

Alarm is false, infer Burglary and JohnCalls being true

[<A, f>][B, J]

Num of Samples	Prior Sampling	Rejection	Likelihood Weighting
10	[<B, 0.0000><J, 0.0300>]	[<B, 0.0000><J, 0.06710>]	[<B, 0.0000><J, 0.0600>]
50	[<B, 0.0041><J, 0.044>]	[<B, 0.0020><J, 0.0581>]	[<B, 0.0020><J, 0.0360>]
100	[<B, 0.0030><J, 0.0424>]	[<B, 0.0000><J, 0.0424>]	[<B, 0.0000><J, 0.0510>]
200	[<B, 0.0000><J, 0.0519>]	[<B, 0.0005><J, 0.0657>]	[<B, 0.0050><J, 0.0455>]
500	[<B, 0.0012><J, 0.0509>]	[<B, 0.0002><J, 0.0471>]	[<B, 0.0006><J, 0.0551>]
1000	[<B, 0.0011><J, 0.0511>]	[<B, 0.0009><J, 0.0508>]	[<B, 0.0016><J, 0.0497>]
10000	[<B, 0.0008><J, 0.0497>]	[<B, 0.0010><J, 0.0504>]	[<B, 0.0011><J, 0.0511>]
Exact	[<B, J, 0.00005>]		

## Table for Case 2:

JohnCalls is true, Earthquake is false, infer Burglary and MaryCalls being true

[<J, t><E, f>][B, M]

Num Samples	Prior Sampling	Rejection	Likelihood Weighting
10	[<B, 0.0000><M, 0.1000>]	[<B, 0.0000><M, 0.0000>]	[<B, 0.0000><M, 0.0666>]
50	[<B, 0.0014><M, 0.1666>]	[<B, 0.0000><M, 0.1583>]	[<B, 0.0014><M, 0.0865>]
100	[<B, 0.0000><M, 0.1717>]	[<B, 0.0000><M, 0.1086>]	[<B, 0.0010><M, 0.0748>]
200	[<B, 0.0000><M, 0.1717>]	[<B, 0.0000><M, 0.1150>]	[<B, 0.0004><M, 0.1542>]
500	[<B, 0.0000><M, 0.1182>]	[<B, 0.0000><M, 0.0963>]	[<B, 0.0012><M, 0.1127>]
1000	[<B, 0.0045><M, 0.1126>]	[<B, 0.0000><M, 0.1258>]	[<B, 0.0003><M, 0.1037>]
10000	[<B, 0.0005><M, 0.1180>]	[<B, 0.0005><M, 0.1061>]	[<B, 0.0013><M, 0.1162>]
Exact	[<B, M, 0.00011>]		

Table for Case 3:

MaryCalls is true, JohnCalls is false, infer Burglary and Earthquake being true

[<M, t><J, f>][B, E]

Num Samples	Prior Sampling	Rejection	Likelihood Weighting
10	[<B, 0.0000><E, 0.0000>]	[<B, 0.0000><E, 0.0000>]	[<B, 0.0000><E, 0.0000>]
50	[<B, 0.0000><E, 0.0000>]	[<B, 0.0000><E, 0.0000>]	[<B, 0.0015><E, 0.0026>]
100	[<B, 0.0000><E, 0.0000>]	[<B, 0.0000><E, 0.0000>]	[<B, 0.0000><E, 0.0134>]
200	[<B, 0.0000><E, 0.0000>]	[<B, 0.0000><E, 0.0000>]	[<B, 0.0009><E, 0.0271>]
500	[<B, 0.0000><E, 0.0000>]	[<B, 0.0000><E, 0.0000>]	[<B, 0.0003><E, 0.0124>]
1000	[<B, 0.0000><E, 0.0090>]	[<B, 0.0062><E, 0.0290>]	[<B, 0.0008><E, 0.0130>]
10000	[<B, 0.0000><E, 0.0116>]	[<B, 0.0008><E, 0.0075>]	[<B, 0.0009><E, 0.0100>]
Exact	[<B, E, 0.00001>]		

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Credits

1. Artificial Intelligence: A Modern Approach (4th Edition)
- Used for the Conditional Probability Table (CPT) diagram and algorithm pseudocodes.
  - Authors: **Stuart Russell** and **Peter Norvig**.
2. ChatGPT
- Assisted in crosschecking **Manual calculations** for algorithm probabilities comparision to ensure the accuracy of the results.