Elements of AI | PA-2 Report
Anwar Shaikh & Gourav Shenoy

1) Alarm is false; Infer John Calls and Burglary being true.

```
$ java -jar infer.jar e 0
1 2
A f
J
B

B 0.001
J 0.05
```

a) P(Burglary = true | Alarm = false)

Num Samples	Prior Sampling	Rejection	LW
10	0	0	0
50	0	0	0
100	0	0	0
200	0	0	2.478807E-4
500	0	0	1.9973861E-4
1000	0	2.0000001E-4	2.9853228E-4
10000	7.0205635E-5	1.1E-4	1.7462873E-4
Exact	0.001	0.001	0.001

b) P(JohnCalls = true | Alarm = false)

Num Samples	Prior Sampling	Rejection	LW
10	0.04	0.05	0.005007489
50	0.036163263	0.049999997	0.008007994
100	0.042162854	0.058	0.008497563
200	0.05821641	0.0555	0.011301341
500	0.05089172	0.044800006	0.010470129
1000	0.050156187	0.0524	0.010473003
10000	0.052431077	0.048870005	0.009708062
Exact	0.049945094	0.05	0.05

2) JohnCalls is true, Earthquake is false; Infer Burglary and MaryCalls being true

```
$ java -jar infer.jar e 0
2 2
J t
E f
B
M

M 0.01
B 9.015329E-5
```

a) P(Burglary = true | JohnCalls = true, Earthquake = false)

Num Samples	**Prior Sampling**	**Rejection**	**LW**
10	0	0	0
50	0	0.0039999997	0
100	0.0010309278	0	0
200	0	4.9999997E-4	9.958153E-7
500	2.1052631E-4	2.0000001E-4	3.9957324E-4
1000	1.0649627E-4	2.0000001E-4	2.9976608E-4
10000	9.519574E-5	1.6E-4	2.1023877E-4
Exact	9.015329E-5	0.0164219810828	0.0164219810828

b) P(MaryCalls = true | JohnCalls = true, Earthquake = false)

Num Samples	Prior Sampling	Rejection	LW
10	0	0.030000001	0.009958176
50	0.006210993	0.023999998	0.0020082325
100	0.011588482	0.012999999	0.0029980163
200	0.011685525	0.010499999	0.0024948488
500	0.010809535	0.0116	0.0010047042
1000	0.009411485	0.0108	0.0018008391
10000	0.010233042	0.01069	0.0024997224
Exact	0.01	0.01	0.01

3) MaryCalls is true and JohnCalls is false; Infer Burglary and Earthquake being true.

```
$ java -jar infer.jar e 0
2 2
M t
J f
B
E

B 9.015329E-5
E 0.0014407019
```

a) P(Burglary = true | MaryCalls = true, JohnCalls = false)

Num Samples	Prior Sampling	Rejection	LW
10	0	0	0
50	0	0	0
100	0	0	3.263952E-4
200	0	0	3.3528073E-4
500	0	2.0000001E-4	2.6520825E-4
1000	0.0010649627	0.0002	2.3398218E-4
10000	7.467375E-5	1.2999999E-4	1.4736054E-4
Exact	9.015329E-5	9.015329E-5	9.015329E-5

b) P(Earthquake = true | MaryCalls = true, JohnCalls = false)

Num Samples	Prior Sampling	Rejection	LW
10	0	0.01	0
50	0.0020833334	0	3.2466545E-5
100	0.0010309278	9.999999E-4	3.4404843E-4
200	0.0021167237	0.0019999999	1.6399016E-4
500	4.2553386E-4	0.002	2.683628E-4
1000	0.0010645364	0.0023000003	4.0254625E-4
10000	0.0013982398	0.00136	3.461574E-4
Exact	0.0014407019	0.0014407019	0.0014407019

Note: Complet Java code is available on GitHub at: https://github.com/anwarsk/Elements-of-Artificial-Intelligence/tree/master/Inference%20Algorithms