Programming Assignment 2

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1. Output for Query 1 : Alarm is false, infer Burglary and JohnCalls being true.

Table B | A			
Num Samples	Prior Sampling	Rejection	LW
10	0	0.4	0
50	0	0.36	0.950455005
100	0.5	0.39	0
200	0	0.31	0.658263305
500	0	0.384	0.704911886
1000	0.666666667	0.381	0.421903052
10000	0.307692308	0.37	0.427796254
Exact	0.373551228		

Table J | A			
Num Samples	Prior Sampling	Rejection	LW
10	1	0.8	0.9
50	0	0.88	0.995955511
100	1	0.89	0.92
200	0	0.905	0.785014006
500	0	0.908	0.979002625
1000	0.666666667	0.885	0.952872531
10000	0.846153846	0.9023	0.922247506
Exact	0.9		

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

Table B | J,E			
Num Samples	Prior Sampling	Rejection	LW
10	0	0.1	0
50	0	0	0
100	0	0	0
200	0	0.03	0.082949309
500	0.035714286	0.016	0.06741573
1000	0.016949153	0.016	0.017126546
10000	0.012096774	0.0155	0.015816029
Exact	0.016438149		

Table M | J,E			
Num Samples	Prior Sampling	Rejection	LW
10	0	0.1	0
50	0	0.02	0.02
100	0	0.01	0
200	0	0.03	0.087557604
500	0.035714286	0.026	0.086142322
1000	0.050847458	0.033	0.041864891
10000	0.04233871	0.0302	0.028041917
Exact	0.033313884		

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

Table B|M,J			
Num Samples	Prior Sampling	Rejection	LW
10	0	0	0
50	0	0	0
100	0	0	0
200	0	0	0.069272637
500	0	0	0
1000	0	0	0.001
10000	0.009615385	0.019047619	0.00590079
Exact	0.006876246		

Table E|M,J			
Num Samples	Prior Sampling	Rejection	LW
10	0	0	0
50	0	0	0
100	0	0	0
200	0	0	0
500	0	0	0.004
1000	0	0	0.003
10000	0.009615385	0.00952381	0.006258257
Exact	0.005612152		

PN : The values only start appearing after 10000 records . The below tables give more closer approximation to actual values if we increase the number of samples.

Also , we have records in rejection sampling as 0 , as if we consider true rejection and keep rejecting samples till we find a valid sample set of mentioned count(ie. 10 50 .. 10000) , it takes a really long time for samples of even 10 to generate . Hence , we are just rejecting samples and looping till the sample size expected in which we may or maynot find the right samples and hence the value 0.

Table B|M,J			
Num Samples	Prior Sampling	Rejection	LW
1000	0	0	0.007185383
10000	0.010989011	0.00952381	0.00942883
50000	0.008528785	0.005988024	0.009340269
100000	0.004056795	0.009018036	0.006904359
500000	0.007636826	0.005323505	0.006614937
10000000	0.006847264	0.00678766	0.00689958
Exact	0.006876246		

Table E|M,J			
Num Samples	Prior Sampling	Rejection	LW
1000	0	0	0.022531308
10000	0	0.00952381	0.004771403
50000	0.004264392	0	0.005524982
100000	0.005070994	0.008016032	0.006238667
500000	0.00678829	0.006961507	0.005436394
10000000	0.005494335	0.004989398	0.005527832
Exact	0.005612152		