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Project 6 Bayesian Networks Write-Up

**Option B Results**

1. Results & Statistics are on the following pages.
2. Both queries converged as the number of samples increased. In general, the Likelihood-Weighting function converged faster than the Rejection sampling method. We hypothesize that the use of evidence variables, and less randomness allows more accurate samples and a more accurate results. As can be observed in both variance graphs, the variance for the smallest number of samples for Likelihood Weighting starts off significantly lower than the variance of rejection sampling.

Query 1 Mean:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Samples | 200 | 400 | 600 | 800 | 1000 |
| Rejection Sampling | 0.4965 | 0.504 | 0.500667 | 0.50225 | 0.4971 |
| Likelihood-Weighting | 0.499 | 0.49875 | 0.495833 | 0.500375 | 0.4937 |

Query 1 Variance:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Samples | 200 | 400 | 600 | 800 | 1000 |
| Rejection Sampling | 0.003306 | 0.00142 | 0.000379 | 0.000256 | 0.000314 |
| Likelihood-Weighting | 0.000927 | 0.00027 | 0.000625 | 9.65E-05 | 0.000102 |

Query 2 Mean:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Samples | 200 | 400 | 600 | 800 | 1000 |
| Rejection Sampling | 0.3485 | 0.3545 | 0.335 | 0.3485 | 0.3491 |
| Likelihood-Weighting | 0.339 | 0.34375 | 0.363833 | 0.351125 | 0.3441 |

Query 2 Variance:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Samples | 200 | 400 | 600 | 800 | 1000 |
| Rejection Sampling | 0.00125 | 0.000596 | 0.000314 | 0.000161 | 9.23E-05 |
| Likelihood-Weighting | 0.00066 | 0.000356 | 0.000314 | 0.000139 | 0.000205 |