**Lab 04**

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| Student ID: | B08611010 |
| Total Score: |  |

**Note:**

Most of the explanations in this lab is optional. However, giving reasonable explanations to your answer or programs will earn you partial credits when your answer is incorrect.

1. **Multiple Choice (10 points, 5 points each question)**

|  |  |  |  |
| --- | --- | --- | --- |
| # | Answer | Explanation (Optional) | Score |
| 1 | (d) |  |  |
| 2 | (c) | Numpy matrices are strictly 2-dimesional. |  |

1. **A Piece of Cake (28 points, 4 points each question)**

|  |  |  |
| --- | --- | --- |
| # | Explanation (Optional) | Score |
| 1 |  |  |
| 2 |  |  |

1. **Programming Exercise (30 points, 6 points each question)**

|  |  |  |
| --- | --- | --- |
| # | Explanation (Optional) | Score |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |

1. **Markov Chains (32 points, 6 / 6 / 4 / 2 / 4 / 6 / 4)**

|  |  |  |
| --- | --- | --- |
| # | Explanation (Optional for questions 1, 2, and 5) | Score |
| 1 |  |  |
| 2 |  |  |
| 3 | **Which state has the highest probability in step 8?**  State 4 has the highest probability.  **What is the probability to reach the final state () in step 8?**  0.  **# paste Lab04\_D3.png here** |  |
| 4 | **How many steps does it take for the probability of being in the final state (i=9) to be at least 1%?**  10 steps. |  |
| 5 | **Try initialing x0 with random numbers and keep , will the probability distribution be different? Give an explanation.**  Probability distributions of the two will be noticeably different for around the first 12 propagations, become more alike toward the 17th propagation, and look basically identical after it. Markov chain converges to a static distribution after enough propagations. |  |
| 6 |  |  |
| 7 | **Which state has the highest probability in step 8?**  State 4 has the highest probability.  **What do you observe from the two figures? Does the result meet your expectation?**  The top of the state histogram is consistent with the probability distribution plot, which indicates that the result of the sampling implementation is consistent with the computational result of probability distribution.  Yes, it does meet my expectation.  **# paste Lab04\_D7.png here** |  |