**Lab 03**

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| Student ID: | B09611007 |
| 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 | B |  |  |

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 0 with prob 0.203279  What is the probability to reach the final state () in step 8?  0.000000000000000 (almost 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%?  Step: 12  Final state prob: 0.0122472000 |  |
| 5 | Try initialing x0 with random numbers and keep , will the probability distribution be different? Give an explanation.  Yes. The initial states can have an effect on the probability distribution.    ( blue: initial state = 0; orange: random initial state) |  |
| 6 |  |  |
| 7 | Which state has the highest probability in step 8?  State 2  What do you observe from the two figures? Does the result meet your expectation?  The upper figure is the probability distribution. The blue line indicates that we initialized x0 at state 0. From the upper figure, we can observe that there are local maximums at state 0, 2, 4, 6, and 8. We can also observe the similar tendency in the plot below. The result meets my expectation.    # paste Lab04\_D7.png here |  |