# CMPE 300 ANALYSIS OF ALGORITHMS

# PROJECT 3 - ANSWERS

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## PART 1

### 1.1) Fill the steps of one successful and one unsuccessful execution for each p value

#### *1.1.1) Success - p=0.7*

|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0** | 46 | -1 | 28 | -1 | -1 | -1 | -1 | 3 |
| **1** | 29 | -1 | 31 | 38 | 27 | 2 | -1 | -1 |
| **2** | -1 | 45 | 26 | -1 | 32 | 37 | 4 | -1 |
| **3** | 25 | 30 | 39 | -1 | 1 | -1 | 33 | 36 |
| **4** | 40 | 15 | 44 | -1 | 22 | 35 | 0 | 5 |
| **5** | 43 | 24 | 41 | 18 | 7 | 10 | -1 | 34 |
| **6** | 14 | 19 | 16 | 23 | 12 | 21 | 6 | 9 |
| **7** | -1 | 42 | 13 | 20 | 17 | 8 | 11 | -1 |

#### *1.1.2) Unsuccessful - p=0.7*

#### 

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **0** | 19 | 4 | 21 | 2 | 17 | -1 | -1 | -1 |
| **1** | -1 | 1 | 18 | -1 | 22 | -1 | 16 | -1 |
| **2** | 5 | 20 | 3 | -1 | 7 | -1 | -1 | -1 |
| **3** | 0 | -1 | 6 | 23 | 10 | -1 | 8 | 15 |
| **4** | -1 | -1 | 11 | -1 | 27 | -1 | -1 | -1 |
| **5** | -1 | -1 | 24 | -1 | 12 | 9 | 14 | -1 |
| **6** | -1 | -1 | -1 | 26 | -1 | 28 | -1 | -1 |
| **7** | -1 | 25 | -1 | -1 | -1 | 13 | -1 | 29 |

#### 

#### 1.1.3) Success - p=0.8

|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0** |  |  |  |  |  |  |  |  |
| **1** |  |  |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |  |  |
| **3** |  |  |  |  |  |  |  |  |
| **4** |  |  |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |  |  |
| **6** |  |  |  |  |  |  |  |  |
| **7** |  |  |  |  |  |  |  |  |

#### *1.1.4) Unsuccessful - p=0.8*

#### 

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **0** |  |  |  |  |  |  |  |  |
| **1** |  |  |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |  |  |
| **3** |  |  |  |  |  |  |  |  |
| **4** |  |  |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |  |  |
| **6** |  |  |  |  |  |  |  |  |
| **7** |  |  |  |  |  |  |  |  |

#### 

#### 1.1.5) Success - p=0.85

|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0** |  |  |  |  |  |  |  |  |
| **1** |  |  |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |  |  |
| **3** |  |  |  |  |  |  |  |  |
| **4** |  |  |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |  |  |
| **6** |  |  |  |  |  |  |  |  |
| **7** |  |  |  |  |  |  |  |  |

#### *1.1.6) Unsuccessful - p=0.85*

#### 

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **0** |  |  |  |  |  |  |  |  |
| **1** |  |  |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |  |  |
| **3** |  |  |  |  |  |  |  |  |
| **4** |  |  |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |  |  |
| **6** |  |  |  |  |  |  |  |  |
| **7** |  |  |  |  |  |  |  |  |

#### 

### 1.2) Fill the table and comment on it

#### 1.2.1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **p** | **Number of Success** | **Number of Trials** | **Probability** | **Total Time of Execution** |
| **0.7** |  | 100000 |  |  |
| **0.8** |  | 100000 |  |  |
| **0.85** |  | 100000 |  |  |

#### 1.2.1) Comments

Also answer these questions while commenting

1- How do changes on p affect total success probability and total execution time?

2- Define trade-offs of the algorithm.

## PART 2

### 2.1) Fill the tables and comment on them

#### 2.1.1) p = 0.7

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **k** | **Number of Success** | **Number of Trials** | **Probability** | **Total Time** |
| **0** |  | 100000 |  |  |
| **2** |  | 100000 |  |  |
| **3** |  | 100000 |  |  |

#### 2.1.2) p = 0.8

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **k** | **Number of Success** | **Number of Trials** | **Probability** | **Total Time** |
| **0** |  | 100000 |  |  |
| **2** |  | 100000 |  |  |
| **3** |  | 100000 |  |  |

#### 2.1.1) p = 0.85

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **k** | **Number of Success** | **Number of Trials** | **Probability** | **Total Time** |
| **0** |  | 100000 |  |  |
| **2** |  | 100000 |  |  |
| **3** |  | 100000 |  |  |

#### 

2.1.2) Comments

Also answer these questions while commenting

1- How does total time change with k?

2- How do total time change with p for a specific k value? How does this change different from the first part?

3- Run this algorithm for each p value for k a value larger than 10 multiple times. What are your thoughts?

## PART 3

In this part, you will compare Part1 and Part2 algorithms according to their ability to solve the actual Knight’s Problem where p=1.

* Run Part1 algorithm with p=1.
* Run Part2 algorithm with p=1 and k=0.
* Run Part2 algorithm with p=1 and a k value you think will work well.

Clearly state your findings and comment on them. When would you choose Part1 algorithm and when would you choose the other?