

CS6.201 - INTRODUCTION TO SOFTWARE SYSTEMS – SPRING 2025

Assignment 1 – Shell Programming

Due Date: **28/1/2025 8:00 PM (Tuesday)**

Total Marks: 50 - Duration: 2 Weeks

NOTE: This assignment is an individual submission, not a group activity. Evaluation will be conducted based on a fixed grading rubric (syntax, logic, input and output) and the marks are divided as per prescribed weightage in respective question. Inputs/output should fit the criteria mentioned in respective questions. Unless it is specified, all input/output criteria are open to interpretation. All questions in the assignment are self-explanatory. **DO NOT** reach us for any clarifications. If you are answering a question based on a certain assumption, please feel free to mention it as you code comment(s). Submissions are accepted only via Moodle.

Q1: Kaprekar's routine is an iterative algorithm named after Indian Mathematician D. R. Kaprekar. The algorithm is illustrated as follows - <https://www.numberphile.com/videos/6174>. Using SHELL, implement the below:

- Write a SHELL Program to implement Kaprekar's routine by reading the input **(10 Marks)**
- Handle the input exceptions and throw relevant prompt messages for atleast 2-3 use-cases **(5 Marks)**
- For given input, print number of iterations it took to return the Kaprekar's routine **(5 Marks)**

Q2: Write a SHELL program to implement the following.

- Write a function that can randomly generate 11-digit bank account numbers **(3 Marks)**
- Now write another function that generates 11-digit bank account number but without four consecutive zeros '0000' in any part of the string **(3 Marks)**
- From the generated 11-digit bank account number from (a), print all possible two-digit prime numbers when the 11-digit bank account number is read in a linear sequence **(5 Marks)** **Example:** If 12345678910 is the generated 11- digit bank account number, 23,67 are the two-digit prime numbers.
- Write another function so that the generated 11-digit bank account number from (a), print the potential 5-digit numbers that are divisible by 7 when the 11-digit number is read is a linear sequence **(10 Mark)** **Example:** 12341000390 is the generated number, 10003 is the five digit number that is divisible by 7.

Q3: Implement 'Stoplight Game' to illustrate Nash Equilibrium by providing random inputs to determine the outcomes. Include comment tag to describe each line of your program **(10 Marks)**

Source: <https://www.youtube.com/watch?v=0i7p9DNvtjk&t=142s>

Submission Instructions:

- Create Q1, Q2, Q3 folders and include all scripts associated with respective question under them
- ZIP these folders into single file as **<rollnumber>.ZIP**
- Please do not forget to include a README.TXT file to mention your assumptions, execution instructions or anything else in the ZIP. If you are using any LLM for this task, please declare your usage with all required details here - <https://forms.office.com/r/Mg97epP413>. If you are found not mentioning about your LLM usage despite using one, you will be awarded '0'.
- You will be awarded '0' if your submission is found to be plagiarized with other submissions.

(--)_/ Happy -_- Programming!