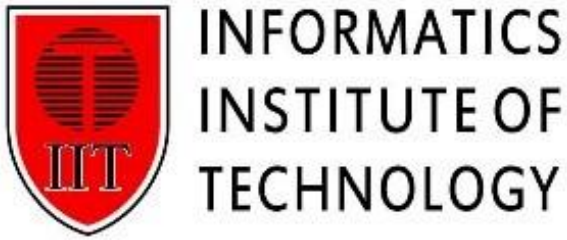

UNIVERSITY OF
WESTMINSTER

Coursework I: Individual Coursework Report

Module: 4COSC006C Software Development I

Module Leader: Mr. Guhanathan Poravi

Assessment Type: Individual Coursework

Submission Date: 12/09/2024

Group: 26

Student ID: 20232554 / w2120418

Student Name: M.A Steffani Silva

School of Computing

Informatics Institute of Technology (IIT Campus)

Abstract

This program is designed to process traffic survey data from CSV files within user-specified date ranges. It incorporates comprehensive date validation mechanisms to ensure input accuracy before data processing begins. The program extracts critical metrics such as vehicle counts, speeding violations, and weather-related information, performing calculations to derive percentages, averages, and other statistical insights for detailed analysis.

Results are presented in a structured format and saved to a text file for documentation purposes. The program supports iterative execution, allowing users to process multiple datasets during a single session. Robust error-handling features are implemented to manage missing files, inconsistent data formats, or other anomalies, ensuring reliable and accurate operation throughout.

Acknowledgement

I'd want to convey my heartfelt appreciation and gratitude to my lecturer Mr. Guhanathan Poravi and Mr. Torin Wirasingha and as well as other module leaders for providing me with the chance to work on this wonderful project which also aided me in conducting extensive study and learning a lot more about the python programming language. I am highly in debt to them for their valuable guidance which has promoted my efforts in all the stages of this coursework.

Secondly, words are not sufficient to express my gratitude to my cherished family members for supporting me. Without the encouragement and support of them I would have not reached this stage. I am truly grateful to all who helped me in my work.

Table of Contents

List of Tables

List of Figures

1. Algorithm

1. Begin.
2. Main Execution Loop
3. Step 1: Input Date Validation
    - Prompt the user for the day, month, and year in the format DD MM YYYY.
    - Validate each input:
    - Day must be an integer between 1 and 31.
    - Month must be an integer between 1 and 12.
    - Year must be between 2000 and 2024.
4. Step 2: Construct File Name
    - Create a CSV file name using the validated date:
      traffic_dataDDMMYYYY.csv

5. Step 3: Check File Existence
    - If the file exists:
        - Proceed to CSV Data Processing.
    - If the file does not exist:
        - Display an error message and prompt the user to continue or exit.
6. CSV Data Processing
    - Initialize Counters for various metrics (e.g., total vehicles, trucks, electric vehicles, speeding violations, etc.).
    - Read CSV File using csv.DictReader.

- For each row in the CSV:
    - Extract and Process Data:
    - Total Vehicles: Count valid vehicle types.
    - Truck Count: Count vehicles categorized as trucks.
    - Electric Vehicles: Count if elctricHybrid is TRUE.
    - Two-Wheeled Vehicles: Count motorcycles, bicycles, and scooters.
    - Buses Heading North: Count buses at Elm Avenue/Rabbit Road heading north.
    - Vehicles Not Turning: Count vehicles passing straight through.
    - Speed Violations: Identify vehicles exceeding the speed limit.
    - Hourly Traffic: Track vehicle counts by hour.
    - Rain Hours: Track hours with Light Rain or Heavy Rain.
    - Scooters: Count scooters at Elm Avenue/Rabbit Road.
- Derived Calculations:
    - Truck Percentage
    - Average Bicycles per Hour.
    - Peak Hour Traffic: Identify the hour with the highest vehicle count.
    - Scooter Percentage at Elm Avenue/Rabbit Road.

7. Display and Save Results
    - Display Results in a structured format.
    - Save Results to a text file (results.txt).
8. Iterate or Exit
    - Prompt the user to process another dataset:
        - If Y, repeat from Step 1.
        - If N, exit the program.
9. End

2. Test Cases and Screenshots

Test Case Description	Input	Expected Output	Actual Output	Remarks
Valid date input test	User inputs 15 for day, 06 for month, 2024 for year.	The system validates and accepts the date 15/06/2024	The system validates and accepts the date 15/06/2024	Test case pass
Invalid day input test	User input 35 for day.	Error message: “Out of range – day must be in the range 1 and 31.” and prompt the user to re-enter the day.	Error message: “Out of range – day must be in the range 1 and 31.” and prompt the user to re-enter the day.	Test case pass
Invalid month input test	User inputs 13 for year.	Error message: “Out of range – month must be in the range 1 and 12.” and prompt the user to re-enter the year.	Error message: “Out of range – month must be in the range 1 and 12.” and prompt the user to re-enter the year.	Test case pass

Invalid year input test	User inputs 1994 for year.	Error message: “Out of range – year must be in the range 2000 and 2024.” and prompt the user to re-enter the year.	Error message: “Out of range – year must be in the range 2000 and 2024.” and prompt the user to re-enter the year.	Test case pass
CSV file processing (Valid file)	Traffic_data16062024.csv exists and contains traffic data.	The system processes the data and extracts relevant metrics then saves the results to “Results”.	The system processes the data and extracts relevant metrics then saves the results to “Results”.	Test case pass
CSV file processing (File not found)	Traffic_data17082024.csv does not exist.	Error message: “The file ‘traffic_data17082024.csv’ was not found. Please check the file name or path.”	Error message: “The file ‘traffic_data17082024.csv’ was not found. Please check the file name or path.”	Test case pass

Continue with new dataset (Valid input)	Uses enters Y when prompted to continue.	The program allows the user to input a new date and load a new data set.	The program allows the user to input a new date and load a new data set.	Test case pass
Exit the program (Valid input)	User enters N when prompted to continue.	The program allows the user to input a new date and load a new data set.	The program allows the user to input a new date and load a new data set.	Test case pass
Processed outcomes display (Sample output)	Traffic_data21062024.csv is processed successfully.	Display: “Data file selected is traffic_data21062024.csv. Total vehicles: 1334 (other outcomes)”	Display: “Data file selected is traffic_data21062024.csv. Total vehicles: 1334 (other outcomes)”	Test case pass

Save results to file	The system processes valid data and calls save results to a text file.	The results are written to “Results”.	The results are written to “Results”.	Test case pass

Table 1:Test cases

Test Case- 1

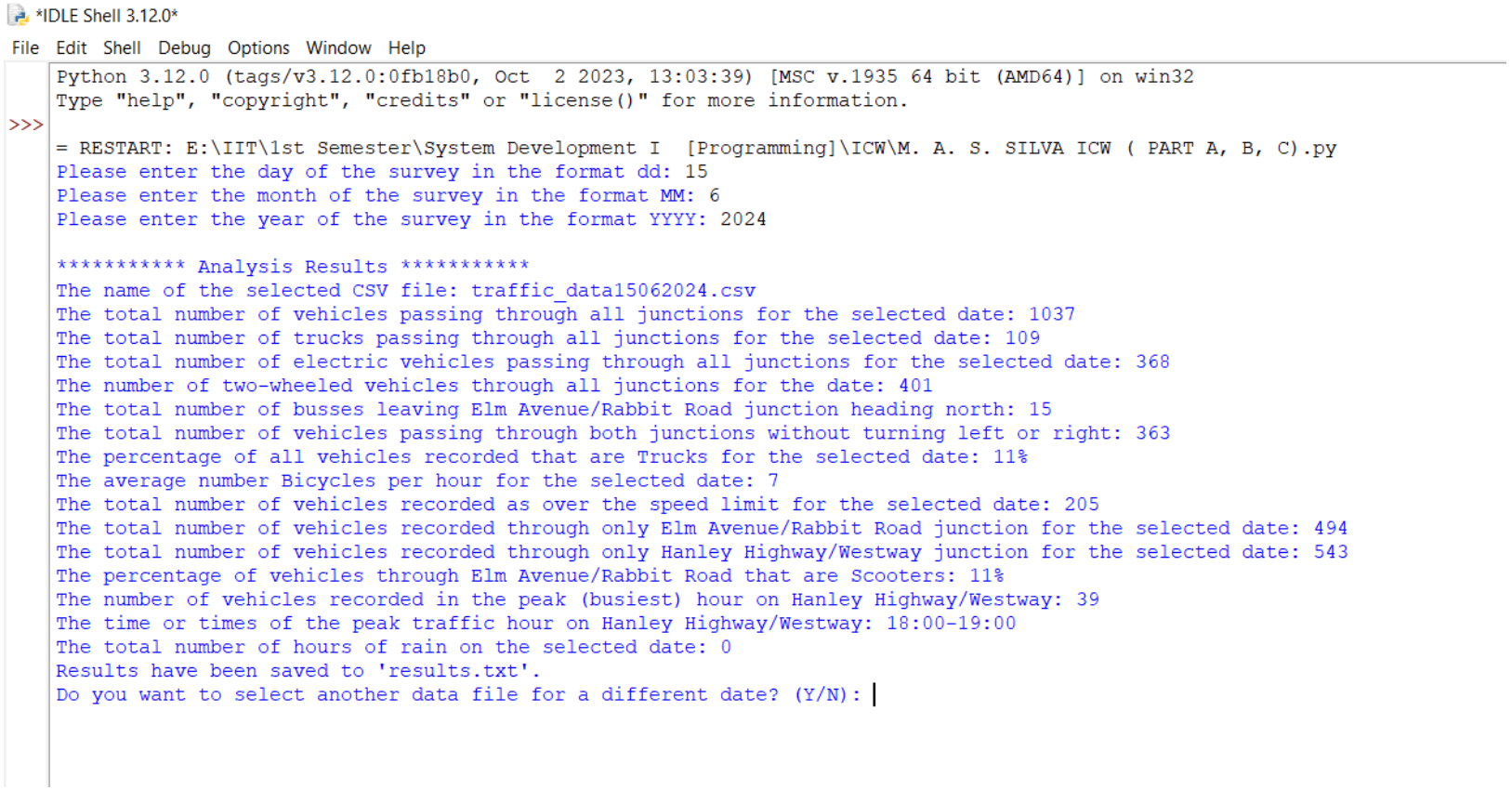

Figure 1: Test Case - 1

Test Case – 2

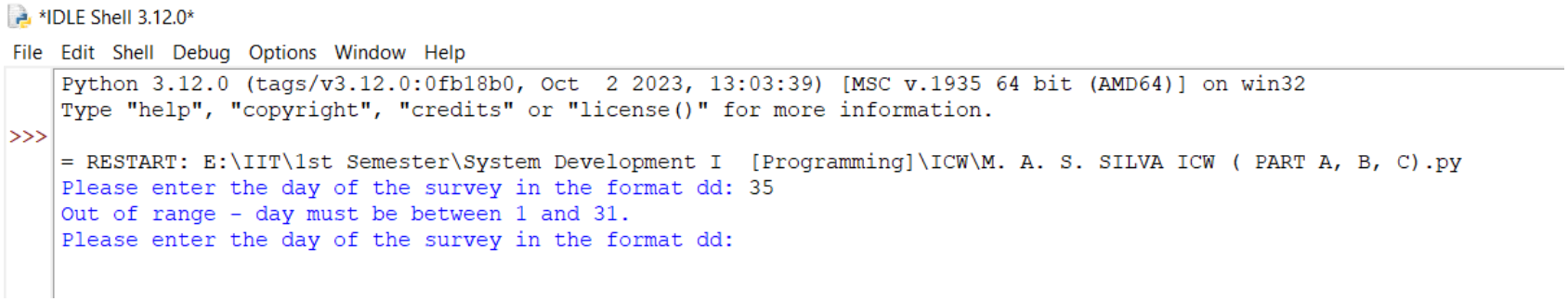

Figure 2: Test Case - 2

Test Case – 3

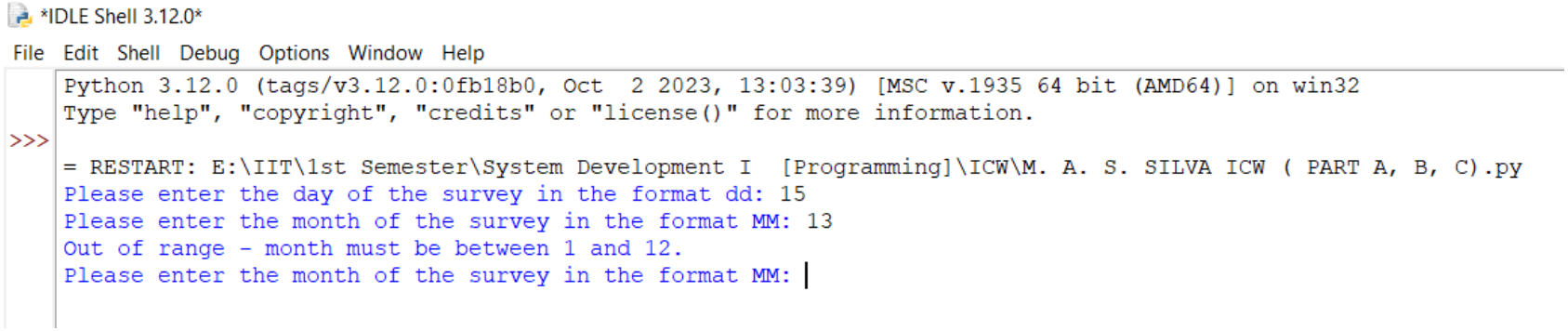

Figure 3: Test Case - 3

Test Case – 4

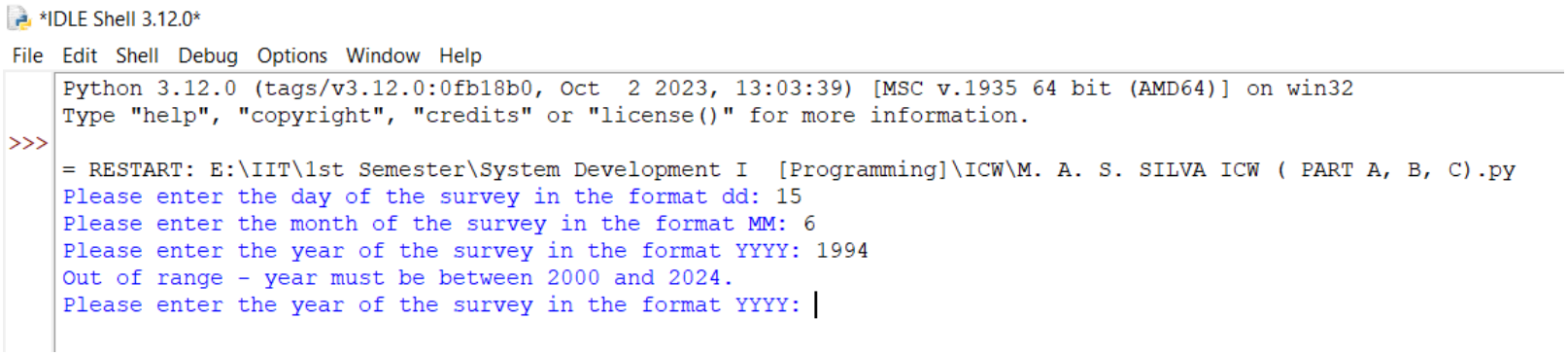

Figure 4: Test Case – 4

Test Case – 5

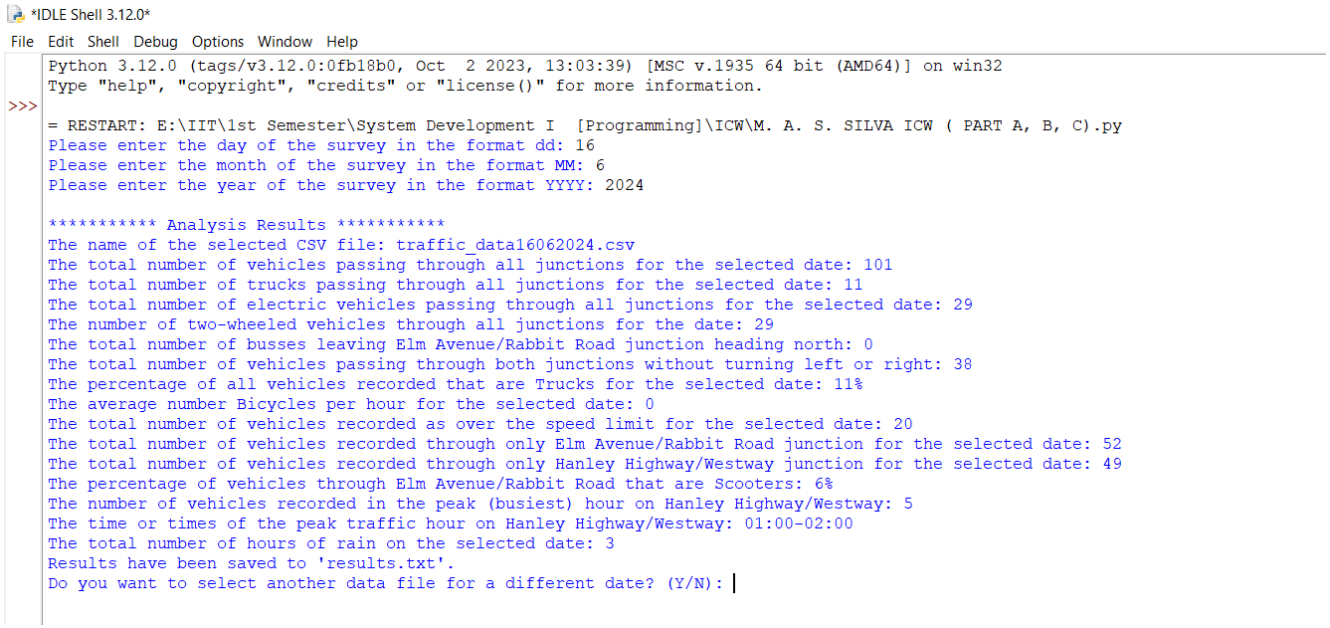

Figure 5: Test Case - 5

Test Case – 6

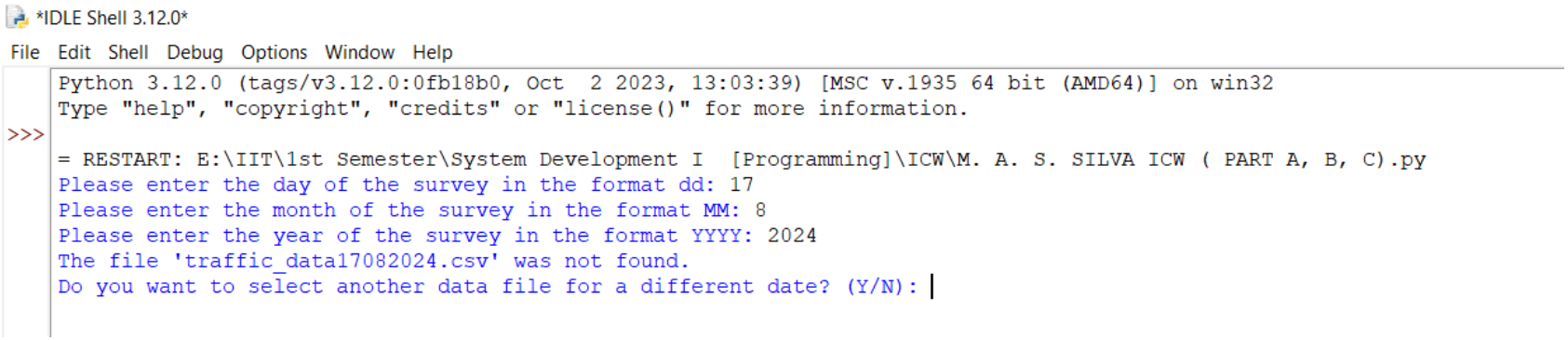

Figure 6: Test Case - 6

Test Case – 7

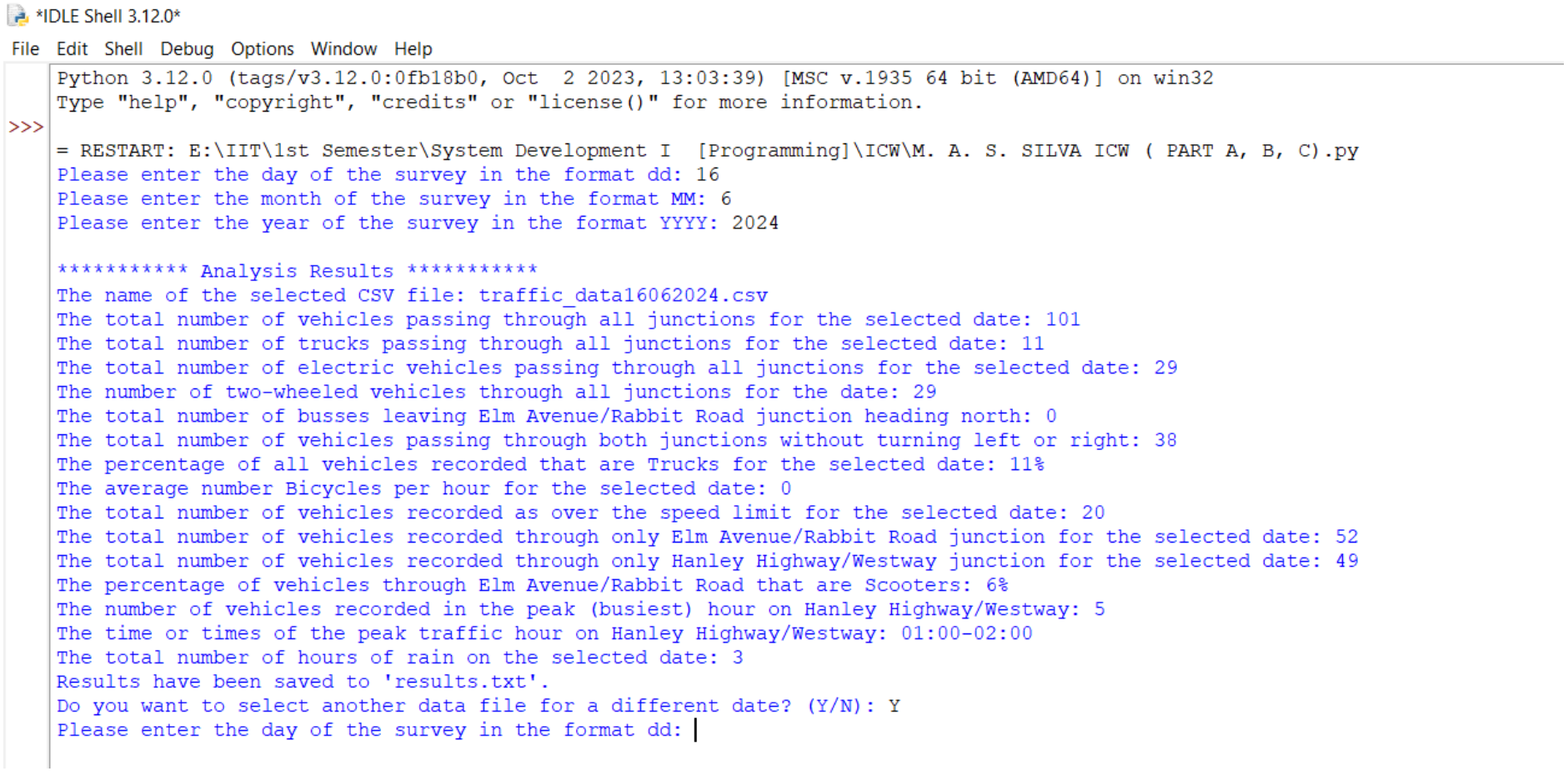

Figure 7: Test Case - 7

Test Case – 8

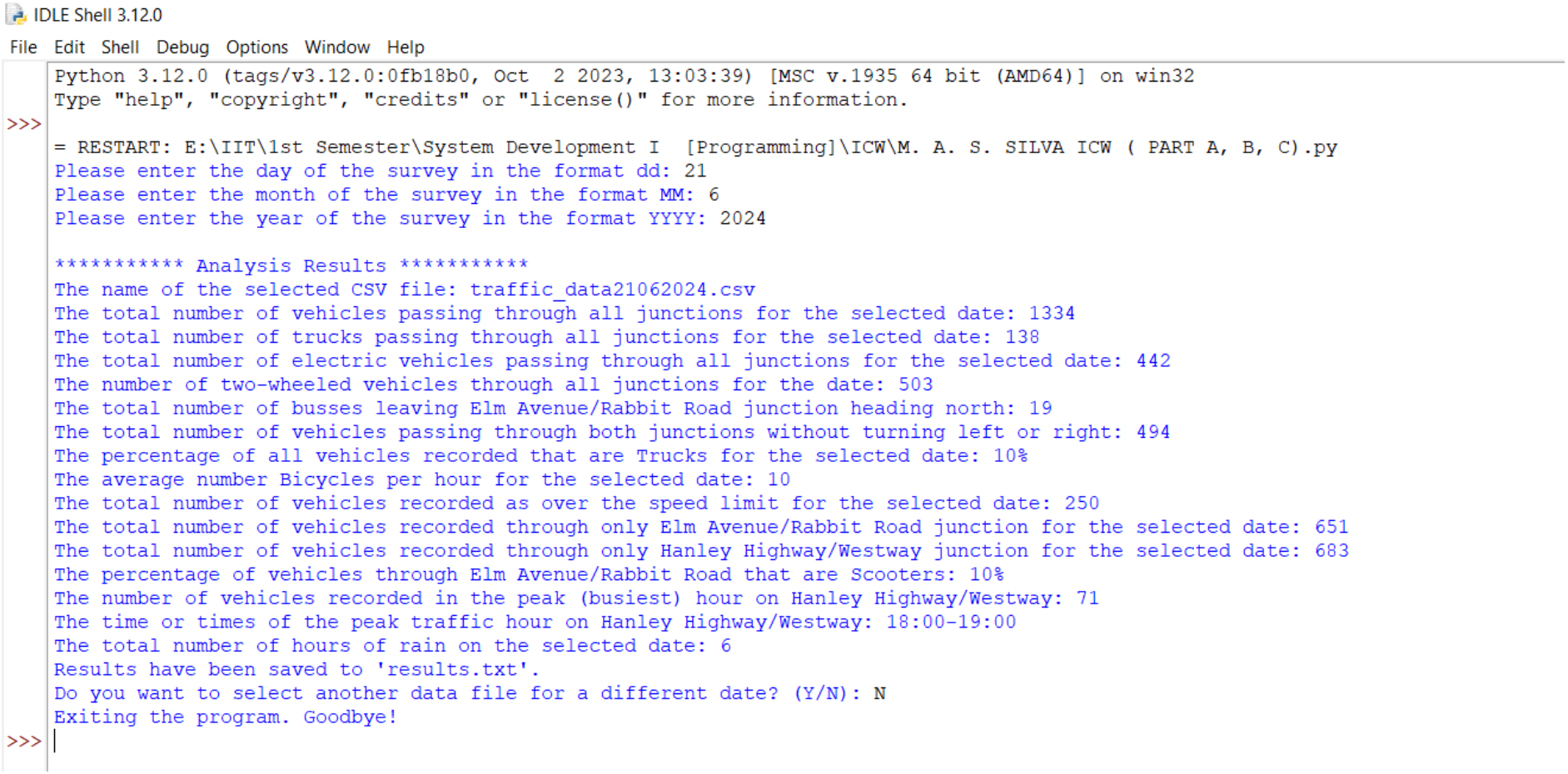

Figure 8: Test Case - 8

Test Case – 9

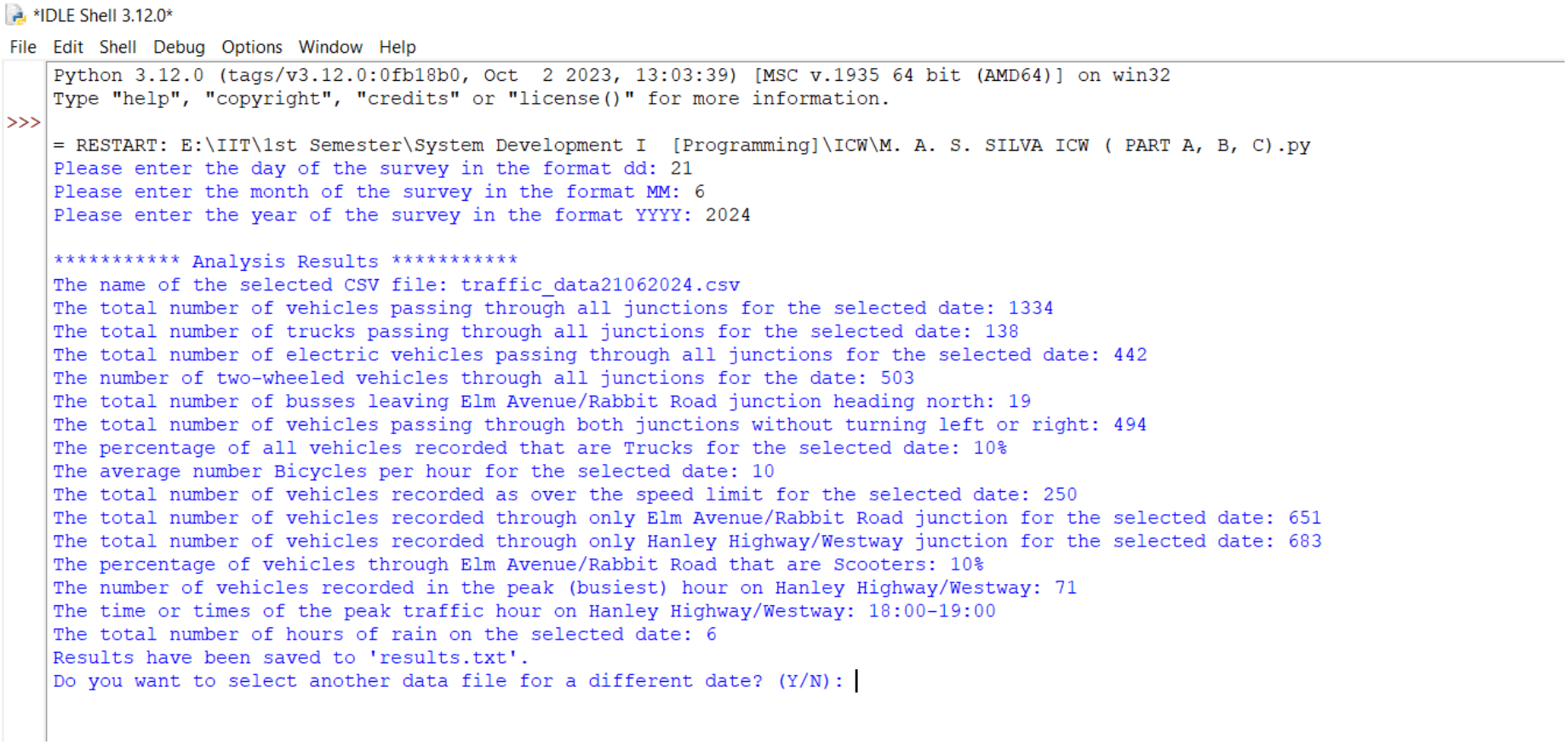

Figure 9: Test Case - 9

Test Case – 10

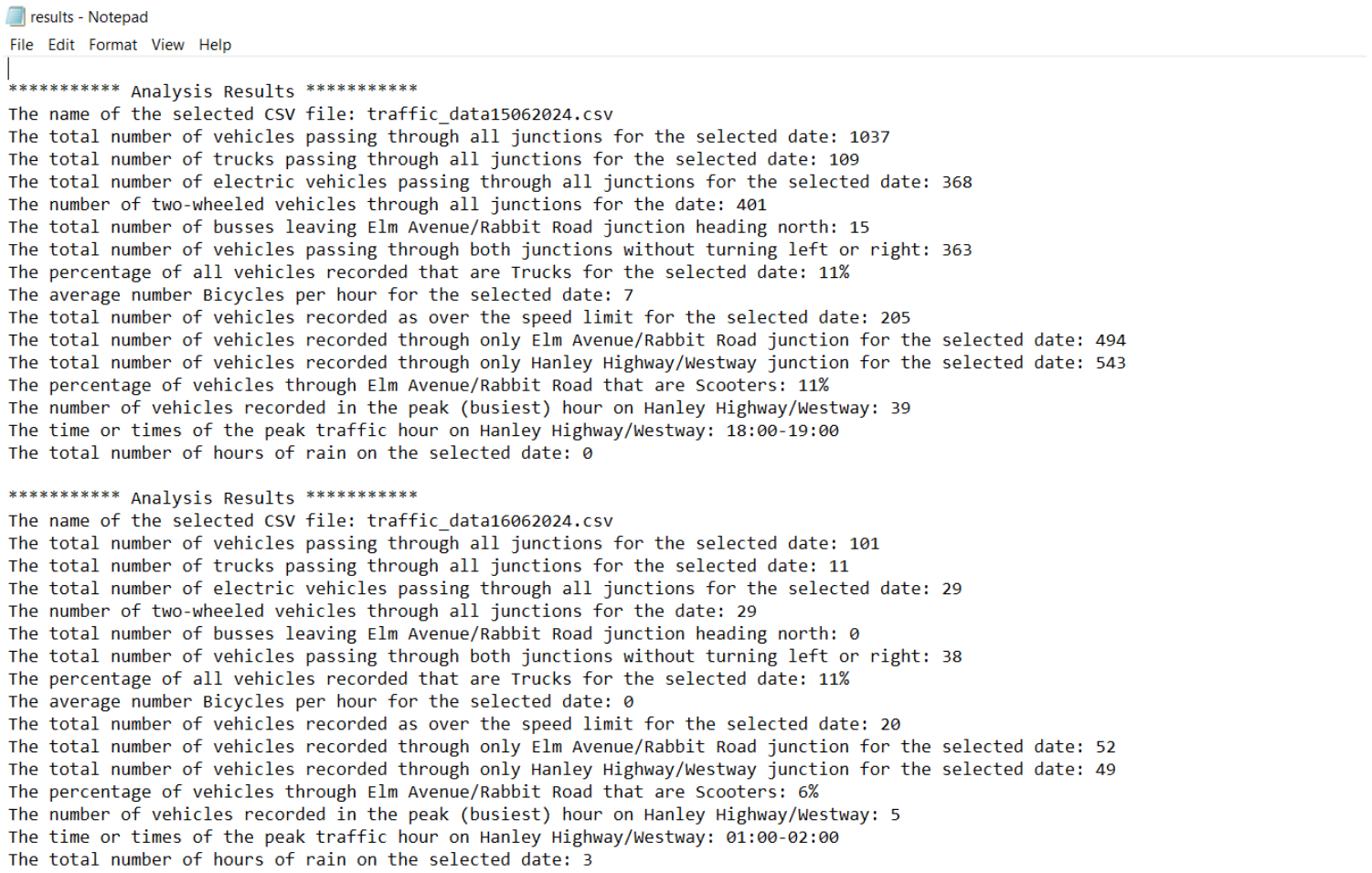

Figure 10: Test Case - 10

3. Results.txt file Screenshots

Results.txt file Screenshots – 1

results - Notepad

File Edit Format View Help

```
********** Analysis Results **********
The name of the selected CSV file: traffic_data15062024.csv
The total number of vehicles passing through all junctions for the selected date: 1037
The total number of trucks passing through all junctions for the selected date: 109
The total number of electric vehicles passing through all junctions for the selected date: 368
The number of two-wheeled vehicles through all junctions for the date: 401
The total number of busses leaving Elm Avenue/Rabbit Road junction heading north: 15
The total number of vehicles passing through both junctions without turning left or right: 363
The percentage of all vehicles recorded that are Trucks for the selected date: 11%
The average number Bicycles per hour for the selected date: 7
The total number of vehicles recorded as over the speed limit for the selected date: 205
The total number of vehicles recorded through only Elm Avenue/Rabbit Road junction for the selected date: 494
The total number of vehicles recorded through only Hanley Highway/Westway junction for the selected date: 543
The percentage of vehicles through Elm Avenue/Rabbit Road that are Scooters: 11%
The number of vehicles recorded in the peak (busiest) hour on Hanley Highway/Westway: 39
The time or times of the peak traffic hour on Hanley Highway/Westway: 18:00-19:00
The total number of hours of rain on the selected date: 0
```

Figure 11: Text File 1

Results.txt file Screenshots – 2

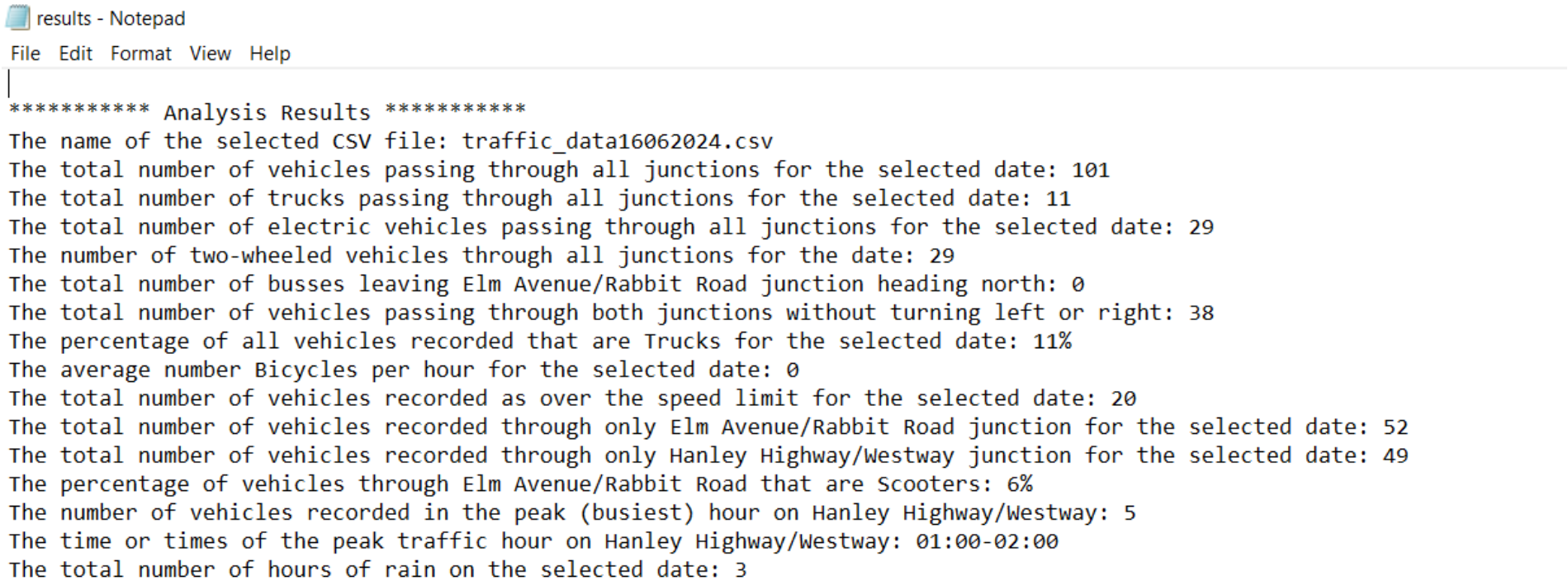

Figure 12: Text File 2

Results.txt file Screenshots – 3

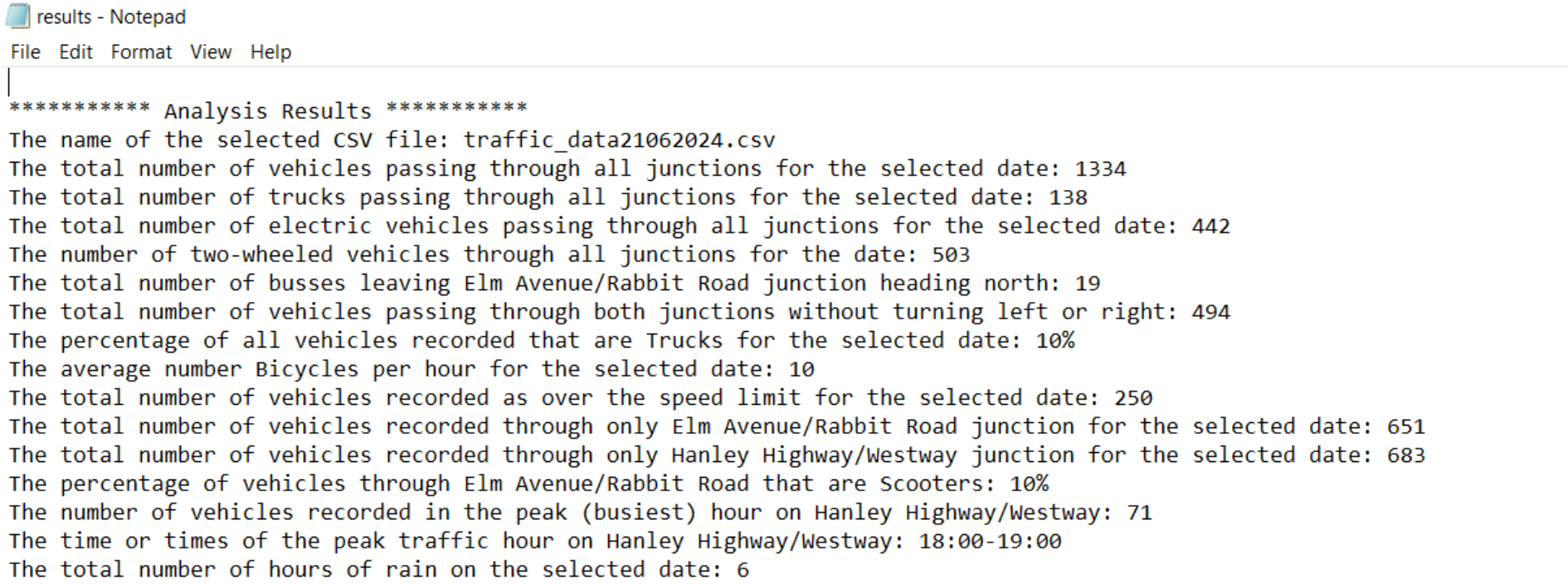

Figure 14: Text File 3

4. References

- **Python Documentation.** *Input and Output.* Retrieved from: https://docs.python.org/3/tutorial/inputoutput.html

- **Python Documentation.** *csv — CSV File Reading and Writing.* Retrieved from: https://docs.python.org/3/library/csv.html

- **W3Schools.** *Python File Handling.* Retrieved from: https://www.w3schools.com/python/python_file_handling.asp

- **GeeksforGeeks.** *Python Error Handling.* Retrieved from: https://www.geeksforgeeks.org/error-handling-python/