Week 1 Task 1

Question A

For this question I used Python language with csv and datetime libraries.

```
import csv
import datetime
```

Figure 1

I designed a function to deal with the update flag and flag text operation. The first input is the path of the csv file that to be read, the second input is the path to the csv file output by python. If output csv file doesn't exist, it will be created by python automatically.

All data of the input file is in reader. In for loop (line 8 of the Figure 2), I can get each row data. The first-row is the attribute and don't need any operation to it. From second row of the data, I extract the first column which is [Date] attribute, and convert it to [date] type data of python. Then use weekday() function to get the exact date(Mon, Tues, Wed…). Finally, add the date to the flag and flag text attribute of each row, write it to a new csv file.

```
1  def update_flag(read_file_path, write_file_path):
2      csv_file = open(file=read_file_path, mode="r")
3      with open(file=write_file_path, mode="w", newline='', encoding='utf-8') as csv_write_file:
4          reader = csv.reader(csv_file)
5          writer = csv.writer(csv_write_file)
6          i = 0
7
8          for row in reader:
9              if i==0:
10                 writer.writerow(row)
11
12             if i!= 0:
13                 str2date = datetime.datetime.strptime(row[0].split(".")[0], "%Y-%m-%d %H:%M:%S")
14                 weekday_index = str2date.weekday() + 1
15                 weekday_string = get_weekday_string(weekday_index)
16
17                 row[8] = weekday_index
18                 row[9] = weekday_string
19                 writer.writerow(row)
20             i=i+1
```

Figure 2

In line 15 of Figure 2, I create a function get_weekday_string() to covert 2 to Tuesday and 5 to Friday, as shown in Figure 3.

```
def get_weekday_string(index):
    week_day = {
        2: "Tuesday",
        5: "Friday"
    }
    return week_day[index]
```

Figure 3

The screenshot of the result is shown below:

Date	Lane	Lane Nam	Direction	Direction	Speed (m	Headway	Gap (s)	Flags	Flag Text
00:03.0	6	SB_NS	2	South	38.525			5	Friday
00:22.0	5	SB_MID	2	South	32.31			5	Friday
00:22.0	4	SB_OS	2	South	44.739			5	Friday
00:36.0	6	SB_NS	2	South	33.554			5	Friday
00:49.1	6	SB_NS	2	South	39.768	12.3	11.847	5	Friday
00:52.1	2	NB_MID	1	North	64.623			5	Friday
00:55.1	1	NB_NS	1	North	29.205	6.319		5	Friday
00:58.0	2	NB_MID	1	North	37.283	6.2	6.089	5	Friday
01:03.0	6	SB_NS	2	South	44.739	14.8	14.575	5	Friday
01:04.1	2	NB_MID	1	North	41.01	5.155	5.242	5	Friday
01:05.1	2	NB_MID	1	North	37.283	1.47	0.949	5	Friday
01:09.0	5	SB_MID	2	South	36.039	47.1	47.017	5	Friday
01:16.1	6	SB_NS	2	South	36.661	12.3	12.24	5	Friday
01:40.0	3	NB_OS	1	North	45.361			5	Friday
01:46.0	2	NB_MID	1	North	38.525	41.3	41.06	5	Friday
01:48.0	5	SB_MID	2	South	47.224	38.9	38.639	5	Friday
01:51.0	6	SB_NS	2	South	57.787	35.7	35.438	5	Friday
######	6	SB_NS	2	South	47.846	4.301	3.334	5	Friday
######	1	NB_NS	1	North	44.117	61.4	61.086	5	Friday
01:57.1	6	SB_NS	2	South	49.709	1.957	1.599	5	Friday
01:58.1	3	NB_OS	1	North	39.146	17.7	17.488	5	Friday
02:04.0	2	NB_MID	1	North	29.825	18.4	17.744	5	Friday
######	6	SB_NS	2	South	41.01	37.2	36.997	5	Friday
02:34.0	4	SB_OS	2	South	45.982	131.9	131.79	5	Friday
02:36.1	6	SB_NS	2	South	42.253	1.721	1.482	5	Friday
######	6	SB_NS	2	South	36.661	3.997	3.067	5	Friday

Date	Lane	Lane Nam	Direction	Direction	Speed (m	Headway	Gap (s)	Flags	Flag Text
00:01.0	3	SW	2	SouthWes	26.098			5	Friday
00:03.1	3	SW	2	SouthWes	34.176	1.636	1.171	5	Friday
00:37.1	3	SW	2	SouthWes	24.855			5	Friday
00:40.1	3	SW	2	SouthWes	36.661	2.38	2.523	5	Friday
00:41.1	2	NE_OS	1	NorthEast	16.155			5	Friday
00:46.0	3	SW	2	SouthWes	20.506	6.6	6.307	5	Friday
00:53.1	2	NE_OS	1	NorthEast	44.739	4.6	11.346	5	Friday
######	3	SW	2	SouthWes	37.903	4.928	8.02	5	Friday
01:04.0	3	SW	2	SouthWes	39.146	9.3	8.964	5	Friday
01:06.0	2	NE_OS	1	NorthEast	22.991	13.5	13.265	5	Friday
01:06.0	3	SW	2	SouthWes	39.768	2.475	1.914	5	Friday
01:15.1	3	SW	2	SouthWes	50.331	8.4	8.124	5	Friday
01:23.1	3	SW	2	SouthWes	30.447	7.9	7.624	5	Friday
01:25.1	3	SW	2	SouthWes	32.31	2.319	1.567	5	Friday
01:28.0	3	SW	2	SouthWes	32.31	4.154	3.285	5	Friday
01:29.0	1	NE_NS	1	NorthEast	29.205			5	Friday
01:30.1	2	NE_OS	1	NorthEast	35.417	23.4	22.991	5	Friday
01:35.0	3	SW	2	SouthWes	42.253	1.271	0.638	5	Friday
01:35.1	2	NE_OS	1	NorthEast	17.399	10.929	4.728	5	Friday
01:35.1	3	SW	2	SouthWes	43.495	4.757	5.809	5	Friday
01:45.1	2	NE_OS	1	NorthEast	39.768	4.866	9.696	5	Friday
######	2	NE_OS	1	NorthEast	29.205	7.1	6.853	5	Friday
######	2	NE_OS	1	NorthEast	44.117	8	7.671	5	Friday
02:05.0	1	NE_NS	1	NorthEast	34.176	35.9	35.808	5	Friday
02:08.0	1	NE_NS	1	NorthEast	34.176	3.404	2.679	5	Friday
02:15.0	1	NE_NS	1	NorthEast	27.962	7	6.738	5	Friday
02:22.1	3	SW	2	SouthWes	44.117	46.1	45.878	5	Friday
22:52.0	2	NE_OS	1	NorthEast	33.554	6.267	4.862	2	Tuesday
22:53.1	3	SW	2	SouthWes	48.468	3.462	3.645	2	Tuesday
22:54.0	1	NE_NS	1	NorthEast	30.447	2.424	1.824	2	Tuesday
22:56.0	3	SW	2	SouthWes	34.798	5.207	3.135	2	Tuesday
22:57.0	3	SW	2	SouthWes	34.798	1.318	0.736	2	Tuesday
23:04.1	2	NE_OS	1	NorthEast	45.982	11.7	11.58	2	Tuesday
23:05.0	1	NE_NS	1	NorthEast	37.283	10.9	10.606	2	Tuesday
23:05.0	3	SW	2	SouthWes	24.233	8.4	8.104	2	Tuesday
23:07.1	1	NE_NS	1	NorthEast	36.661	1.861	1.33	2	Tuesday
23:08.0	1	NE_NS	1	NorthEast	35.417	1.926	1.132	2	Tuesday
23:09.0	2	NE_OS	1	NorthEast	36.039	5.3	5.105	2	Tuesday
23:10.0	2	NE_OS	1	NorthEast	36.039	1.645	1.033	2	Tuesday
23:12.0	1	NE_NS	1	NorthEast	37.903	4.043	3.747	2	Tuesday
23:12.0	3	SW	2	SouthWes	32.31	5.677	6.475	2	Tuesday
23:14.0	2	NE_OS	1	NorthEast	36.039	4.469	3.727	2	Tuesday
23:14.1	1	NE_NS	1	NorthEast	37.903	1.83	1.317	2	Tuesday
23:15.0	3	SW	2	SouthWes	37.283	2.88	2.616	2	Tuesday
23:18.0	3	SW	2	SouthWes	32.31	4.015	2.788	2	Tuesday
23:29.1	2	NE_OS	1	NorthEast	34.176	14.1	13.752	2	Tuesday
23:37.0	2	NE_OS	1	NorthEast	29.825	8.7	8.438	2	Tuesday
23:39.0	1	NE_NS	1	NorthEast	31.691	25.4	25.069	2	Tuesday
23:39.0	3	SW	2	SouthWes	34.176	20.7	20.34	2	Tuesday
23:42.1	3	SW	2	SouthWes	32.932	3.26	2.447	2	Tuesday
23:44.0	3	SW	2	SouthWes	36.661	2.593	1.588	2	Tuesday

Question B

For this question, Python is also be used. Read the file and add 1 to variable Tue_volume when attribute [flag] is 2, add 1 to variable Fri_volume when arrtibute [flag] is 5.

B. Calculate the total traffic volume for each day of the week

```
def calculate_volume(read_file_path):
    csv_file = open(read_file_path, mode="r")
    reader = csv.reader(csv_file)
    Tue_volume = 0
    Fri_volume = 0
    i = 0

    for row in reader:
        if i != 0:
            if int(row[8])==2:
                Tue_volume = Tue_volume + 1
            if int(row[8])==5:
                Fri_volume = Fri_volume + 1
        i=i+1

    return Tue_volume, Fri_volume
```

```
Tue_volume1, Fri_volume1 = calculate_volume("output_rawpvr_2018-02-01_28d_1083 TueFri.csv")
print("1083 Tuesday volume: ", Tue_volume1, " Friday volume: ", Fri_volume1)

Tue_volume2, Fri_volume2 = calculate_volume("output_rawpvr_2018-02-01_28d_1415 TueFri.csv")
print("1415 Tuesday volume: ", Tue_volume2, " Friday volume: ", Fri_volume2)
```

```
1083 Tuesday volume:  248017  Friday volume:  255751
1415 Tuesday volume:  138891  Friday volume:  150187
```

Result: Site 1083 has 248,017 traffic volume on Tuesday and 255,751 on Friday.

Site 1415 has 138,891 traffic volume on Tuesday and 150,187 on Friday.

In total: 386,908 on Tuesday; 405938 on Friday.

Question C

No data preparation step. All data is cleaned and within reasonable value range. Although there are some missing values in Headway and Gap(s), they don't affect the result of question A and B.