4. Traffic check

Certainly everybody has seen a police patrol who watched the traffic from a roadside checkpoint during his/her service. The patrol's task is to screen for those who break the rules of road traffic as well as to check the passing vehicles at random or systematically. In certain cases a technical checking station capable of testing the technical condition of the selected vehicles is also installed.

You have to process the data of a day when both police and technical checks were performed on a one-way road. The machine attached to the traffic registration camera of the police car stored the data of at least 50 but at most 1000 vehicles passing on the street in file *vehicles.txt*. The lines of the file have the same structure, they contain the time and the registration number in the order of passing. The registration number is always 7 characters long, it contains the letters of the English alphabet, a hyphen and numerals in this order. Registration numbers different from the ones given in the example are also possible.

For example:
```
11 12 05 TI-2342
11 12 09 BU-5523
11 12 41 AAAA-99
11 13 12 DM-5632
…
```

The second line shows that the vehicle whose registration number is BU-5523 passed the checkpoint at 11 hours 12 minutes 9 seconds.

Create a program that answers the following questions. Save the source code of the program as *patrol*. (When writing the program you do not have to check the correctness or the validity of the data given by the user.)

Before displaying the results of exercise parts requiring writing on the screen display the number of the exercise part (for example `Exercise 3:`). If you request data from the user, display the kind of the value to be entered on the screen. Displays with or without accents are both accepted.

1. Read the data from file *vehicles.txt* and solve the following exercises using these.

2. Determine the minimum duration of the daily shift of the patrol if its work starts on the hour sharp and ends on the hour sharp (Each hour starts at 0 minutes 0 seconds and ends at 59 minutes 59 seconds). Display the result on the screen.

3. One vehicle is selected for technical check every hour. It is the vehicle that passes first in the given hour. Display the hour of the check and the registration number of the checked vehicle on the screen in the following format: `9 hour: AB-1234`. Every hour's data should be displayed in a separate line. Display only the data of the hours when there was a vehicle to be checked.

4. The first character of the registration number has a special meaning. From the possible letters "***B***" stands for bus, "***K***" for truck and "***M***" for motorbike, the other letters belong to cars. Display the number of vehicles that belong in the different categories and pass the checkpoint on the screen.

5. Find the start and the end of the longest period without traffic. Display the answer on the screen in the following format: `9:9:13 - 9:15:3`.

6. The patrol searches for a vehicle that was seen near an accident based on the registration number. The witnesses recalled only certain characters from the registration number so when the vehicle is searched for in the registry, the unknown characters of the registration number are replaced by character *. Request such a number from the user and then display the registration numbers that match it on the screen.

7. A road check lasts for exactly 5 minutes. While the check is in progress, vehicles may pass freely, the next vehicle is stopped only when the previous check is finished. If the patrol checked the first vehicle, then which vehicles were checked until the end of the shift? Write the time of the passing and the registration number of the checked vehicles into file `checked.txt` in the order of passing, in the same format as the input. Pay attention to the fact that the numbers belonging to temporal data contain leading zeros as well.

45 marks