IF 100 - Fall 2017
Bonus Homework
Due November 29th 2017 Wednesday 23:55 (Sharp Deadline)

This is a bonus homework and the weight of this homework (for grading) will be the half of the Homework 3. Actually, it is an extension of Homework 3, therefore we strongly suggest you to complete Homework 3 first, and then extend your work for this one. Note that, this homework has a different submission item on SuCourse. If you complete both Homework 3 and the bonus homework, then you should submit them separately.

In Homework 3, we have explained the D'Hondt method in detail, how it is used to calculate the seat allocation among the political parties in a given electoral district. However, we ignored an important concept: the barrage, which is also known as the threshold. In some cases, a threshold or barrage is set, and a political party which does not achieve that threshold across the country, does not get any seats allocated to it in any electoral district, even if it received enough votes to have some seats in some districts. For example, in Turkey, a 10% barrage/threshold value is currently used (although there are discussions whether we should change this value for future elections). This means that, if a political party has less than 10% of all the votes in Turkey, then that party does not get any seats in any district. Examples of countries using the D'Hondt method with such a threshold are Denmark (2%); Spain (3%); Slovenia (4%); Croatia, Romania, and Serbia (5%); Russia (5%); Belgium (5%, on regional basis); and so on.

In this bonus homework, you will

- calculate the seat distribution of each political party **across the country** (not just for a given district as in Homework 3) and **for different threshold values** (not just for the current 10% threshold),
- print the results on the screen, and
- plot them by using matplotlib module of Python.

Thereby, you will have a chance to detect critical threshold values which have a significant effect on the seat distribution.

Prepared Dataset

You will be using the same dataset file with Homework 3 (***elections_2002.py***). All detailed explanations regarding the variables in this file were given in the Homework 3 document.

In order to be able to use these variables in your newly created homework file (***username_hwBonus.py***), you should write the following line to the beginning of your program:

```
from elections_2002 import *
```

Note that, your ***username_hwBonus.py*** and ***elections_2002.py*** files should be located in the same directory (folder) on your computer.

Inputs and Outputs

In this homework, you will input two different integers from the user which are *the lower threshold value* and *the upper threshold* value respectively. For simplicity, you may assume that both inputs will be entered as valid positive integers; and *the lower threshold value* is smaller than *the upper threshold value*. One other assumption is that *the upper threshold value* is smaller than the greatest country-wide percentage value retrieved by any party in the elections.

After you read the inputs from the user, you need to print seat distribution of the political parties in the same order that they occur in *partyNames* list in *elections_2002.py* for each integer threshold between *the lower threshold value* and *the upper threshold value* (both are inclusive). In addition, you need to plot a chart that shows the seat distribution of each political party for different thresholds.

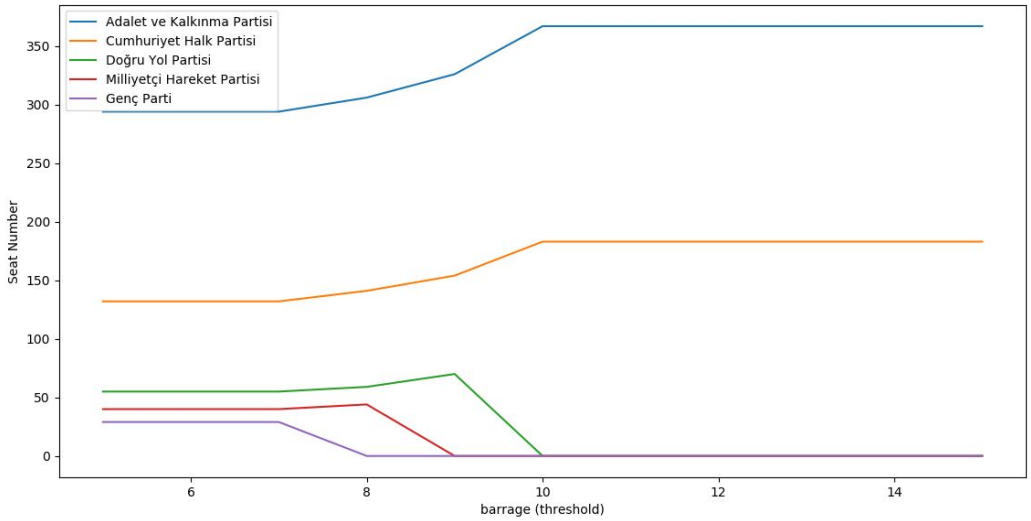
One important point is that the format (sentences, spaces, newlines, order, and everything) of the input and the output should be exactly the same with the sample runs. The reason is that we will automatize the process of grading your homeworks. Therefore there should be an exact match in order to get a full grade. Please see sample runs for the input and output format.

Sample Runs

Below, we provide some sample runs of the program that you will develop. The *italic* and **bold** phrases are inputs taken from the user. Again, we want to emphasize that every single character (even spaces) in input and output should be exactly same with the sample run. Whenever you see a space in the sample runs, it means a single space (not multiple consecutive spaces). The legends of the plots may occur in a different position depending on your window size.

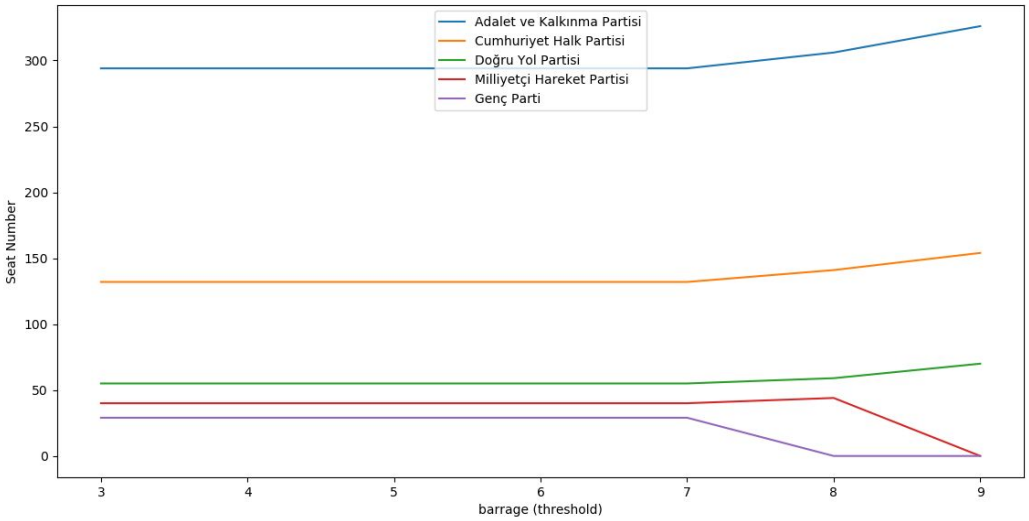
Sample Run 1:

```
Please enter a lower bound for the threshold (barrage): 5
Please enter an upper bound for the threshold (barrage): 15
The result for threshold 5 is [294, 132, 55, 40, 29]
The result for threshold 6 is [294, 132, 55, 40, 29]
The result for threshold 7 is [294, 132, 55, 40, 29]
The result for threshold 8 is [306, 141, 59, 44, 0]
The result for threshold 9 is [326, 154, 70, 0, 0]
The result for threshold 10 is [367, 183, 0, 0, 0]
The result for threshold 11 is [367, 183, 0, 0, 0]
The result for threshold 12 is [367, 183, 0, 0, 0]
The result for threshold 13 is [367, 183, 0, 0, 0]
The result for threshold 14 is [367, 183, 0, 0, 0]
The result for threshold 15 is [367, 183, 0, 0, 0]
```



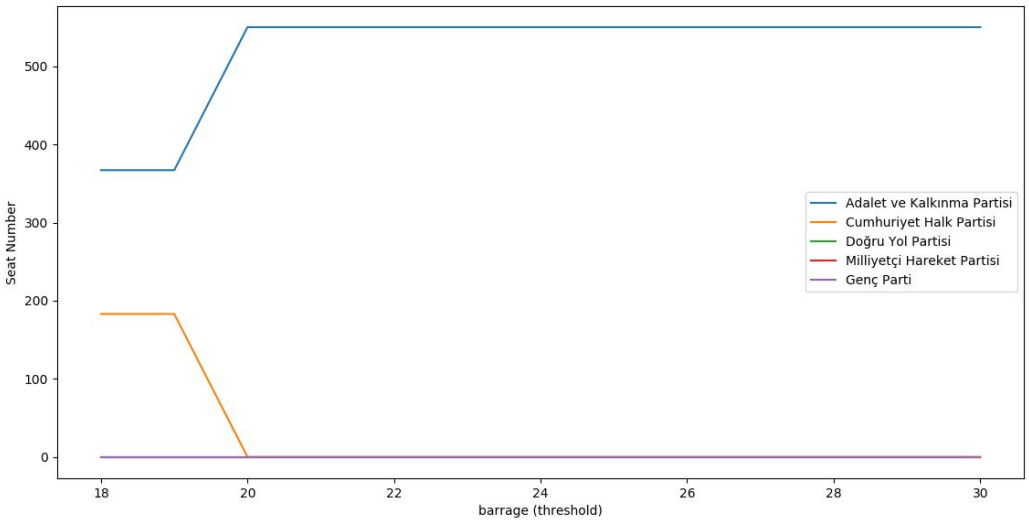
Sample Run 2:

```
Please enter a lower bound for the threshold (barrage): 3
Please enter an upper bound for the threshold (barrage): 9
The result for threshold 3 is [294, 132, 55, 40, 29]
The result for threshold 4 is [294, 132, 55, 40, 29]
The result for threshold 5 is [294, 132, 55, 40, 29]
The result for threshold 6 is [294, 132, 55, 40, 29]
The result for threshold 7 is [294, 132, 55, 40, 29]
The result for threshold 8 is [306, 141, 59, 44, 0]
The result for threshold 9 is [326, 154, 70, 0, 0]
```



Sample Run 3:

```
Please enter a lower bound for the threshold (barrage): 18
Please enter an upper bound for the threshold (barrage): 30
The result for threshold 18 is [367, 183, 0, 0, 0]
The result for threshold 19 is [367, 183, 0, 0, 0]
The result for threshold 20 is [550, 0, 0, 0, 0]
The result for threshold 21 is [550, 0, 0, 0, 0]
The result for threshold 22 is [550, 0, 0, 0, 0]
The result for threshold 23 is [550, 0, 0, 0, 0]
The result for threshold 24 is [550, 0, 0, 0, 0]
The result for threshold 25 is [550, 0, 0, 0, 0]
The result for threshold 26 is [550, 0, 0, 0, 0]
The result for threshold 27 is [550, 0, 0, 0, 0]
The result for threshold 28 is [550, 0, 0, 0, 0]
The result for threshold 29 is [550, 0, 0, 0, 0]
The result for threshold 30 is [550, 0, 0, 0, 0]
```



How to get help?

You may ask questions to TAs, LAs or instructors. Information regarding the office hours of the TAs, LAs and the instructors are available at the SUCourse.

What and where to submit?

You should prepare (or at least test) your program using Python 3.6.x. We will use IDLE with Python 3.6.x while testing your homework.

It'd be a good idea to write your name and lastname in the program (as a comment line of course).

Submission guidelines are below. Students are expected to strictly follow these guidelines in order to have a smooth grading process. If you do not follow these guidelines, depending on the severity of the problem created during the grading process, 20 or more penalty points are to be deducted from your grade.

Name your py file that contains your program as follows:

"username_hwBonus.py"

For example: if your SuCourse username is "***inancarin***", then the name of the py file should be: ***inancarin_hwBonus.py***

Please make sure that this file is the latest version of your homework program.

However, this is not the only file that you will submit. In this homework, you will submit two files together in one submission:
username_hwBonus.py and ***elections_2002.py***
If you forget to submit any of these files, then your program may not be executed and your grade may become 0.

You may visit the office hours if you have any questions regarding submissions.

General Homework Rules

- Successful submission is one of the requirements of the homework. If, for some reason, you cannot successfully submit your homework and we cannot grade it, your grade will be 0.
- There is NO late submission. You need to submit your homework before the deadline. Please be careful that SUCourse time and your computer time may have a 1-2 minutes differences. You need to take this time difference into consideration.
- Do NOT submit your homework via email or in hardcopy! SUCourse is the only way that you can submit your homework.
- If your code does not work because of a syntax error, then we cannot grade it; and thus, your grade will be 0.
- Having a correct program is necessary, but not sufficient to get the full grade. Comments, meaningful and understandable identifier names will also affect your grade.
- Please do submit your **own** work only (even if it is not working correctly). It is really easy to find out “similar” programs!
- Plagiarism will not be tolerated. Please check our plagiarism policy given in syllabus of the course.

Good luck!
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