Program development methodology: English first, then Python

1. **Define the problem**

   A. Write an English description of the input and output **for the entire program**. (Do not give details about *how you will compute* the output.)

   B. Create test cases **for the entire program**

      • Input *and* expected output

2. **Decide upon an algorithm**

   A. Implement it in English

      • Write the recipe or step-by-step instructions

   B. Test it using paper and pencil

      • Use small but not trivial test cases

      • Play computer, animating the algorithm

      • Be introspective

         1. Notice what you really do

         2. May be more or less than what you wrote down

         3. Make the algorithm more precise

3. **Translate it into code**

   A. Implement it in Python

      • Decompose it into logical units (functions)

      • For each function:

         – Name it (important and difficult!)

         – Write its documentation string (its specification)

         – Write tests

         – Write its code

         – Test the function

   B. Test the whole program

Problem

You are given a csv file containing information about delay of all flights, at all major airports in the USA for one particular month.

For a given list of airports, for each airport, considering all flights that originate at that airport, calculate the average delay per day of the month. Print this information to a .txt file and also plot all airports on one graph.

We will plot things using a method that works like this: plot(x_values, y_values) where x_values and y_values are lists of numbers to plot.

Sample Input in a csv file for November 2012:

YEAR	MONTH	DAY_OF_MONTH	CARRIER	TAIL_NUM	FL_NUM	ORIGIN	DEST	DELAY
2012	11	21	DL	N705DL	14	SEA	LAX	2
2012	11	7	UA	N38654	1256	IAH	EWR	1
2012	11	3	AA	N323AA	100	JFK	SEA	5
2012	11	4	AA	N335AA	1	JFK	LAX	0
2012	11	5	AA	N335AA	1	JFK	LAX	2
2012	11	4	UA	N24454	1459	DEN	ORD	5
2012	11	6	DL	N908DL	201	SEA	EWR	7

Sample Output to a text file:

```
Average Delay in minutes:
Delay for SEA
Day   Avg Delay
1     11.74
2     4.41
3     3.19
4     7.38
…
25    17.62
26    6.66
27    5.7
…
```
Sample Plot: