

## Programming Project 07

This assignment is worth 50 points (5.0% of the course grade) and must be **completed and turned in before 11:59 on Monday, March 26, 2018.**

### Assignment Overview

- List and Tuples
- File manipulation

### Assignment Background

Modern medicine has improved greatly over the past few centuries. From treating infections to building our immune system to combat diseases that our ancestors were defenseless against. However, these treatments are very expensive and unfortunately very few individuals can afford it. For this reason, Medicaid was signed into a law back in 1965 to help patients of low income households by covering some of the medication expenses. The Centers for Medicare & Medicaid Services have a record of its drug spending and utilization by their beneficiaries. This document records the annual total spending, prescriptions fill count, and unit count for each medication. The prescription fill count records how many medications were prescribed by a certified physician. The unit count indicates how many units for this medication were prescribed. Each prescription have certain units (number of pills, grams, milliliters or other units). For example, one prescription of Xanax can have 60 pills, i.e. 60 units. For more information, see the interactive dashboard (<https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Information-on-Prescription-Drugs/2015Medicaid.html>).

For this project, you are tasked to build an interface which will show the user some medications covered by Medicaid and how much the medications cost. You must read the file that we provide of Medicaid Drug Expending Data from 2011 to 2015 and store into a list of tuples for the program to extract and process the information. We want to display a table with the information of each medication for each year. Also, we want to plot two charts presenting the top 10 most prescribed medications and another for the top 10 most covered or money spent by Medicaid.

### Project Specifications

1. You must implement the following functions:
  - a) **open\_file()** prompts the user to enter a filename. The program will try to open a comma-separated value (csv) file. An error message should be shown if the file cannot be opened. This function will loop until it receives proper input and successfully opens the file. It returns a file pointer.

- b) **read\_data(fp)** receives a file pointer of the data file. For this project, we are only interested in the following columns:

**column 0: year (int) # convert year to an int**  
**column 1: brand (string)**  
**column 3: total (float) # total spending on that drug**  
**column 4: prescriptions (int)**  
**column 5: units (int)**

In addition to these variables, you must compute two more values. In this function you need to compute the average cost per prescription as well as the average cost per unit. Only append the medications where they have defined numeric values for the total, prescriptions, *and* units.

This function returns a sorted list of tuples (we sort so we have a canonical ordering for Mimir testing). Each tuple should include the following data in the this order:

**(year, brand, total, prescriptions, units, avg\_cost\_prescription, avg\_cost\_units)**

- c) **get\_year\_list(year, data)** This function receives the specified year (integer) and the list of tuples with the entire dataset, that is, the list returned by read\_data. This function returns a sorted list of tuples with all the medications covered by Medicaid during the specified year.
- d) **top\_ten\_list(column, year\_list)** Receives column index (integer) and a list of tuples containing all the medications covered for a specific year, i.e. data returned from the get\_year\_list function. This function returns two lists: (list1) containing the brand names of the top 10 and (list2) the values in the specified column for the top 10 tuples reverse order. 3 is for Medicaid coverage, 4 is for number of prescriptions. Note that column n is in index n-1 of the tuple, so you should adjust it. Hint: sort the whole list in reverse order, slice off the top ten, and then create the two lists to return as a tuple (list1,list2).
- e) **display\_table(year, year\_list)** This function displays the following information for each medication in a year (sorted by brand name, A-Z): brand name, number of prescriptions, average prescription cost, and the total spending per medication. Remember to use string formatting specified below to properly display the results. Divide the total spending by 1000 to make the output look nicer.
- f) **main()** This function is the main part of the program. You need to open the file and pass the file pointer to the read\_data function. Then you need to prompt for a year to search in the data list and send it to the display\_table function to output. Then you prompt whether you want to plot the top 10 medications in the data list. Hint: Make sure that the entered year exists in the data file (validate the input!)

## 2. Requirements

- a) Use **sorted()** and **itemgetter()** functions. For the top 10 lists, sort the list of tuples from largest item first, if two tuples have the same value, sort by brand name. Hint: both top 10 functions will sort; in the example below, **y** is the index of the brand name.

```
from operator import itemgetter

sorted_lst = sorted(num_list, key=itemgetter(x,y), reverse=True)
```

- b) For `display_table`, use the following formatting. To get commas in numbers place a comma immediately after the field width, e.g. `{:10,d}` or `{:10,.2f}`:
- The header should be centered on 80 spaces
  - Medication Brand Name = 35 spaces, left justified
  - Prescription = 15 spaces, right justified with comma between 3 digits
  - Average Prescription Cost = 20 spaces, right justified, 2 decimal digits
  - Total spending by Medicaid = 15 spaces, right justified, 2 decimal digits, with comma between 3 digits (this value is in thousands)
- c) **plot\_top\_ten(x, y, title, xlabel, ylabel)** You must use this provided function to plot the results. This function has 5 parameters: the list of medication brand names **x**, the list of numeric values **y**, the plot **title**, the x-axis title **xlabel**, and the y-axis title **ylabel**. Note that this function will be used to draw both plots, one for the most prescribed medications and the other for the highest prescription cost.
- d) **Read the file only once.** Specifically, you read the file once in the `read_data` function and store the information in a list. For the rest of the program you get information from lists—you don't go back and re-read the file.
- e) **Want an extra challenge?** Using list comprehension you can write the function `get_year_list` in one line that is readable.

## Deliverables

The deliverable for this assignment is the following file:

proj07.py – the source code for your Python program

Be sure to use the specified file name and to submit it for grading via Mimir before the project deadline.

## Read\_data function test:

```
fp = open("medicaid_spending_small.csv", "r")
```

```
read_data(fp)
```

returns:

```
[(2011, 'Abilify', 1715769087.0, 3007841, 98263157, 570.4321096095173,
17.460960337352077), (2011, 'Adderall XR', 376431028.8, 1613783, 55728012,
233.26000385429765, 6.7547901906136545), (2011, 'Advair Diskus', 578947345.1,
2462514, 150975222, 235.10418421986637, 3.8347176273733186), (2011,
'Carbamazepine', 11436846.03, 618588, 99627263, 18.48863222370948,
0.11479634876650179), (2011, 'Clobetasol Propionate', 10157350.16, 379057,
20788507, 26.796366140184723, 0.4886041195743398), (2011, 'Flovent HFA',
280559007.5, 1924032, 22347142, 145.81826471701095, 12.55458114062192),
(2011, 'Humalog', 128527266.2, 602919, 10883844, 213.17501389075483,
11.808995626912697), (2011, 'Invega', 283641529.9, 380435, 8945035,
745.5715954105168, 31.709381785538007), (2011, 'Lantus', 410789437.2,
2204518, 36172479, 186.33979727087734, 11.35640820193717), (2011, 'Lyrica',
208052625.3, 1080100, 75574568, 192.6234842144246, 2.752944949682015), (2011,
'Methylphenidate ER', 226032289.6, 1332576, 44673828, 169.6205616790337,
5.0596131945531955), (2011, 'Morphine Sulfate', 20089793.94, 576161,
31066801, 34.86836828594785, 0.6466643907108428), (2011, 'Proair HFA',
221936930.0, 4784692, 44759787, 46.384789240352355, 4.9584000477929), (2011,
'Seroquel XR', 371592404.1, 952900, 36177324, 389.9594963794732,
10.271417645484227), (2011, 'Spiriva', 215473653.8, 936931, 28940707,
229.97814545574863, 7.445348650259305), (2011, 'Suboxone', 318060139.8,
1198265, 48316821, 265.4338896654747, 6.582803529230534), (2011, 'Symbicort',
128740153.2, 621462, 6467805, 207.15691900711548, 19.904767258753164), (2011,
'Truvada', 457327611.8, 427891, 12715594, 1068.794650506788,
35.96588659562424), (2011, 'Ventolin HFA', 199072297.7, 4889379, 95528093,
40.715251916449915, 2.08391365773417), (2011, 'Vyvanse', 385235408.5,
2453085, 75585425, 157.04119853164485, 5.096689057447253), (2013, 'Enbrel',
255847098.5, 108123, 470496, 2366.259708850106, 543.7816655189417)]
```

### Get\_year\_list function test:

```
fp = open("medicaid_spending_small.csv", "r")
data = read_data(fp)
get_year_list(2011, data)
```

returns:

```
[(2011, 'Abilify', 1715769087.0, 3007841, 98263157, 570.4321096095173,
17.460960337352077), (2011, 'Adderall XR', 376431028.8, 1613783, 55728012,
233.26000385429765, 6.7547901906136545), (2011, 'Advair Diskus', 578947345.1,
2462514, 150975222, 235.10418421986637, 3.8347176273733186), (2011,
'Carbamazepine', 11436846.03, 618588, 99627263, 18.48863222370948,
0.11479634876650179), (2011, 'Clobetasol Propionate', 10157350.16, 379057,
20788507, 26.796366140184723, 0.4886041195743398), (2011, 'Flovent HFA',
280559007.5, 1924032, 22347142, 145.81826471701095, 12.55458114062192),
(2011, 'Humalog', 128527266.2, 602919, 10883844, 213.17501389075483,
11.808995626912697), (2011, 'Invega', 283641529.9, 380435, 8945035,
745.5715954105168, 31.709381785538007), (2011, 'Lantus', 410789437.2,
2204518, 36172479, 186.33979727087734, 11.35640820193717), (2011, 'Lyrica',
208052625.3, 1080100, 75574568, 192.6234842144246, 2.752944949682015), (2011,
'Methylphenidate ER', 226032289.6, 1332576, 44673828, 169.6205616790337,
5.0596131945531955), (2011, 'Morphine Sulfate', 20089793.94, 576161,
31066801, 34.86836828594785, 0.6466643907108428), (2011, 'Proair HFA',
```

```
221936930.0, 4784692, 44759787, 46.384789240352355, 4.9584000477929), (2011,
'Seroquel XR', 371592404.1, 952900, 36177324, 389.9594963794732,
10.271417645484227), (2011, 'Spiriva', 215473653.8, 936931, 28940707,
229.97814545574863, 7.445348650259305), (2011, 'Suboxone', 318060139.8,
1198265, 48316821, 265.4338896654747, 6.582803529230534), (2011, 'Symbicort',
128740153.2, 621462, 6467805, 207.15691900711548, 19.904767258753164), (2011,
'Truvada', 457327611.8, 427891, 12715594, 1068.794650506788,
35.96588659562424), (2011, 'Ventolin HFA', 199072297.7, 4889379, 95528093,
40.715251916449915, 2.08391365773417), (2011, 'Vyvanse', 385235408.5,
2453085, 75585425, 157.04119853164485, 5.096689057447253)]
```

### Top\_ten\_list function test:

```
fp = open("medicaid_spending_small.csv","r")
data = read_data(fp)
list_2011 = get_year_list(2011,data)
top_ten_list(3,list_2011)
```

returns:

```
['Abilify', 'Advair Diskus', 'Truvada', 'Lantus', 'Vyvanse', 'Adderall XR',
'Seroquel XR', 'Suboxone', 'Invega', 'Flovent HFA']
[1715769087.0, 578947345.1, 457327611.8, 410789437.2, 385235408.5,
376431028.8, 371592404.1, 318060139.8, 283641529.9, 280559007.5]
```

### Test Case 1:

Input a file name: medicaid\_spending\_small.csv  
Medicaid drug spending 2011 - 2015

Enter a year to process ('q' to terminate): 2011

Drug spending by Medicaid in 2011			
Medication	Prescriptions	Prescription Cost	Total
Abilify	3,007,841	570.43	1,715,769.09
Adderall XR	1,613,783	233.26	376,431.03
Advair Diskus	2,462,514	235.10	578,947.35
Carbamazepine	618,588	18.49	11,436.85
Clobetasol Propionate	379,057	26.80	10,157.35
Flovent HFA	1,924,032	145.82	280,559.01
Humalog	602,919	213.18	128,527.27
Invega	380,435	745.57	283,641.53
Lantus	2,204,518	186.34	410,789.44
Lyrica	1,080,100	192.62	208,052.63
Methylphenidate ER	1,332,576	169.62	226,032.29
Morphine Sulfate	576,161	34.87	20,089.79
Proair HFA	4,784,692	46.38	221,936.93
Seroquel XR	952,900	389.96	371,592.40
Spiriva	936,931	229.98	215,473.65
Suboxone	1,198,265	265.43	318,060.14
Symbicort	621,462	207.16	128,740.15
Truvada	427,891	1,068.79	457,327.61
Ventolin HFA	4,889,379	40.72	199,072.30
Vyvanse	2,453,085	157.04	385,235.41

Do you want to plot the top 10 values (yes/no)? no

Enter a year to process ('q' to terminate): q

## Test Case 2:

Input a file name: xxx

Unable to open the file. Please try again.

Input a file name: test.csv

Unable to open the file. Please try again.

Input a file name: medicaid\_spending.csv

Medicaid drug spending 2011 - 2015

Enter a year to process ('q' to terminate): year

Invalid Year. Try Again!

Enter a year to process ('q' to terminate): 2015

Medication	Prescriptions	Prescription Cost	Total
Abilify	2,074,321	978.44	2,029,596.06
Adderall XR	1,805,993	248.65	449,064.90
Advair Diskus	1,758,551	330.32	580,892.33
Advate	16,979	20,828.38	353,645.10
Anucort-HC	18,364	273.61	5,024.49
Aripiprazole	947,738	638.50	605,129.20
Ativan	7,168	734.32	5,263.61
Atripla	265,692	2,269.63	603,023.28
Avastin	144,610	1,297.06	187,568.41
Carbamazepine	585,130	64.50	37,741.07
Clindamycin Phos-Benzoyl Perox	10,413	630.46	6,564.98
Clobetasol Propionate	741,509	193.99	143,846.67
Complera	138,938	2,255.99	313,442.46
Copaxone	51,497	5,418.03	279,012.52
Daraprim	2,585	6,075.41	15,704.94
Demerol	48,806	100.42	4,900.98
Econazole Nitrate	218,702	211.28	46,206.96
Enbrel	136,508	3,204.75	437,474.12
Epitol	58,483	46.27	2,706.08
Epzicom	117,317	1,205.16	141,386.15
Fentanyl Citrate	474,760	116.52	55,317.74
Flovent HFA	2,264,825	194.88	441,361.06
Gleevec	20,001	9,528.69	190,583.27
Glumetza	7,873	2,048.88	16,130.82
Granisetron HCl	43,149	180.47	7,787.08
H.P. Acthar	3,278	44,101.85	144,565.87
Harvoni	78,467	27,720.64	2,175,155.84
Herceptin	53,136	3,290.87	174,863.75
Humalog	941,420	377.72	355,593.19
Humira	219,266	3,673.43	805,458.62
Hydroxychloroquine Sulfate	545,452	110.00	60,001.01
Invega	526,070	1,380.61	726,297.32
Isentress	188,181	1,229.77	231,419.27

Lantus	3,651,839	393.11	1,435,574.72
Latuda	715,975	881.91	631,424.75
Lyrica	1,356,527	370.87	503,093.90
Mestinon	7,268	1,070.04	7,777.04
Methylphenidate ER	3,576,101	195.86	700,422.21
Morphine Sulfate	662,978	62.43	41,389.73
Naproxen Sodium	370,485	27.33	10,126.81
Neulasta	75,594	3,729.84	281,953.81
Norditropin Flexpro	79,156	3,473.33	274,934.63
Novoseven RT	4,444	67,098.11	298,184.00
Phenergan	10,047	255.73	2,569.27
Prezista	265,823	1,259.27	334,742.62
Proair HFA	6,690,081	58.56	391,742.23
Proctosol-HC	146,493	49.12	7,195.57
Pulmozyme	66,738	3,356.32	223,994.30
Quelicin	29,416	223.57	6,576.41
Remicade	52,764	3,576.20	188,694.62
Retin-A Micro	1,667	1,953.85	3,257.07
Revlimid	14,475	9,954.78	144,095.51
Reyataz	178,383	1,303.60	232,540.89
Sabril	13,297	9,962.99	132,477.85
Seroquel XR	743,257	650.00	483,117.34
Sovaldi	27,228	22,713.59	618,445.60
Spiriva	1,255,363	324.15	406,925.46
Stribild	176,445	2,580.10	455,245.06
Suboxone	2,051,871	233.41	478,918.14
Symbicort	1,682,405	270.45	455,006.23
Synagis	100,034	2,338.19	233,898.45
Tecfidera	39,697	5,505.27	218,542.81
Tivicay	132,094	1,457.12	192,476.94
Triumeq	81,914	2,422.67	198,450.69
Truvada	527,386	1,396.28	736,377.75
Ventolin HFA	7,227,336	49.25	355,949.41
Viekira Pak	8,612	24,413.83	210,251.89
Vyvanse	3,496,935	223.81	782,651.74
Xifaxan	93,982	1,441.23	135,449.72
Xolair	55,631	2,501.20	139,144.34

Do you want to plot the top 10 values (yes/no)? no

Enter a year to process ('q' to terminate): 2012

Drug spending by Medicaid in 2012

Medication	Prescriptions	Prescription Cost	Total
Abilify	2,934,565	642.71	1,886,082.01
Adderall XR	1,511,503	243.27	367,706.53
Advair Diskus	2,359,382	251.29	592,900.57
Advate	7,514	21,674.67	162,863.51
Anucort-HC	4,186	21.75	91.04
Ativan	19,385	147.53	2,859.96
Atripla	280,155	1,789.12	501,231.12
Avastin	93,763	1,506.96	141,296.63
Carbamazepine	617,133	17.96	11,084.27
Clindamycin Phos-Benzoyl Perox	3,149	149.21	469.86
Clobetasol Propionate	448,435	33.37	14,965.04
Complera	39,684	1,877.01	74,487.19

Copaxone	51,778	4,052.88	209,850.07
Daraprim	3,944	482.90	1,904.57
Demerol	64,621	24.61	1,590.54
Econazole Nitrate	170,593	23.28	3,971.12
Enbrel	104,737	2,120.79	222,125.19
Epitol	40,968	6.75	276.57
Epzicom	121,222	979.45	118,730.83
Fentanyl Citrate	285,140	55.18	15,733.57
Flovent HFA	2,071,046	148.45	307,448.30
Gleevec	16,077	5,910.02	95,015.38
Glumetza	6,226	371.46	2,312.70
Granisetron HCl	37,292	63.47	2,367.08
H.P. Acthar	1,303	44,059.63	57,409.70
Herceptin	51,709	2,407.18	124,472.77
Humalog	626,575	231.68	145,165.13
Humira	114,272	2,323.64	265,527.47
Hydroxychloroquine Sulfate	348,418	13.86	4,827.38
Invega	406,323	907.23	368,629.81
Isentress	195,434	1,031.31	201,553.62
Lantus	2,517,919	211.79	533,281.27
Latuda	160,905	514.19	82,735.78
Lyrica	1,019,589	211.20	215,339.53
Mestinon	8,367	189.46	1,585.18
Methylphenidate ER	2,932,089	168.52	494,115.10
Morphine Sulfate	524,402	35.99	18,874.21
Naproxen Sodium	340,547	10.55	3,594.08
Neulasta	74,648	2,998.11	223,802.72
Norditropin Flexpro	32,740	2,769.43	90,671.08
Novoseven RT	3,804	56,437.66	214,688.85
Phenergan	11,335	17.52	198.57
Prezista	200,271	1,032.74	206,827.56
Proair HFA	5,455,972	49.57	270,467.51
Proctosol-HC	89,636	9.58	858.33
Pulmozyme	63,223	2,595.71	164,108.80
Quelicin	22,282	53.63	1,194.87
Remicade	42,291	2,889.87	122,215.65
Retin-A Micro	39,562	258.50	10,226.79
Revlimid	9,249	8,498.63	78,603.81
Reyataz	256,659	1,003.84	257,643.89
Sabril	8,972	4,663.81	41,843.68
Seroquel XR	887,711	460.66	408,935.89
Spiriva	1,047,429	256.28	268,436.97
Stribild	2,520	2,381.47	6,001.31
Suboxone	1,407,720	278.23	391,667.33
Symbicort	698,988	219.94	153,732.12
Synagis	185,864	2,151.77	399,936.52
Truvada	470,894	1,175.92	553,732.04
Ventolin HFA	5,123,890	42.73	218,962.67
Vyvanse	2,889,840	165.16	477,289.95
Xifaxan	52,056	1,065.21	55,450.67
Xolair	36,764	2,167.00	79,667.51

Do you want to plot the top 10 values (yes/no)? no

Enter a year to process ('q' to terminate): q



**Test Case 3 - Plot Test (Not on Mimir):**

Input a file name: medicaid\_spending.csv

Medicaid drug spending 2011 - 2015

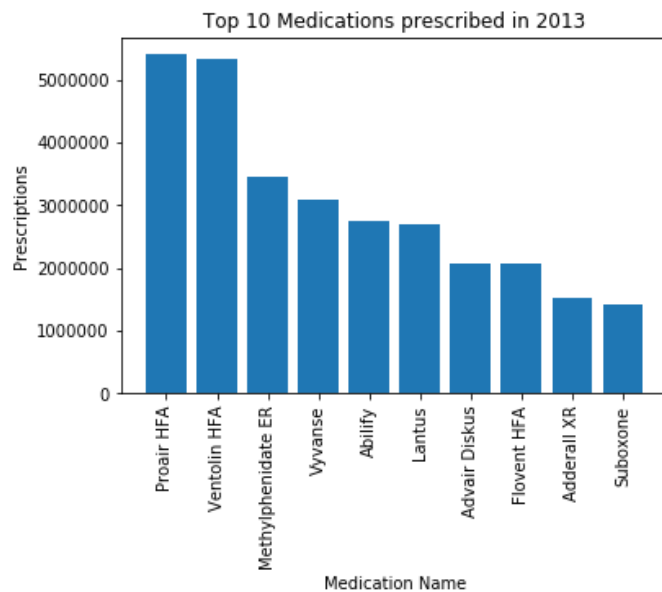
Enter a year to process ('q' to terminate): 2013

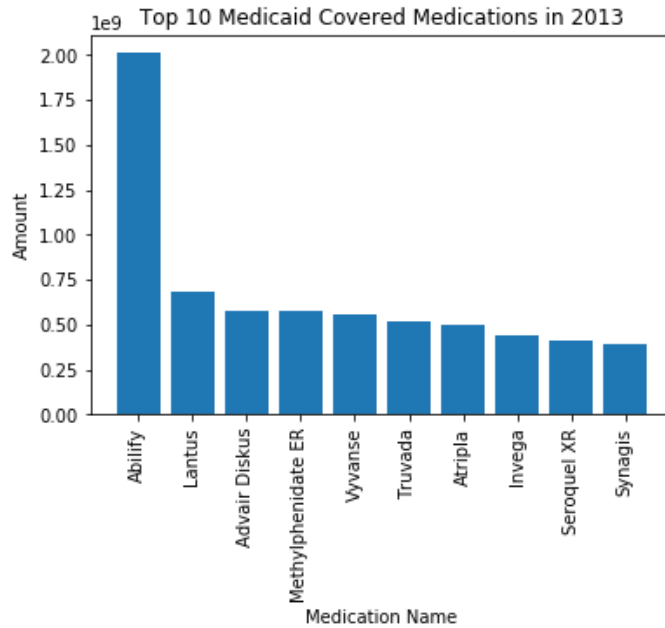
Drug spending by Medicaid in 2013

Medication	Prescriptions	Prescription Cost	Total
Abilify	2,749,155	731.64	2,011,387.68
Adderall XR	1,519,701	248.41	377,512.24
Advair Diskus	2,077,435	279.31	580,242.45
Advate	15,337	17,737.43	272,038.97
Anucort-HC	4,543	28.94	131.48
Ativan	10,861	140.91	1,530.45
Atripla	258,157	1,915.29	494,445.97
Avastin	103,654	1,399.94	145,109.44
Carbamazepine	584,314	17.67	10,324.83
Clindamycin Phos-Benzoyl Perox	11,159	144.24	1,609.57
Clobetasol Propionate	459,091	32.34	14,849.21
Complera	73,381	1,959.14	143,763.70
Copaxone	47,909	4,582.08	219,523.00
Daraprim	3,466	579.98	2,010.21
Demerol	57,556	55.21	3,177.66
Econazole Nitrate	150,475	22.02	3,312.83
Enbrel	108,123	2,366.26	255,847.10
Epitol	45,149	6.59	297.40
Epzicom	118,963	1,032.01	122,771.48
Fentanyl Citrate	307,787	82.84	25,496.16
Flovent HFA	2,065,708	161.34	333,273.79
Gleevec	16,455	6,588.75	108,417.85
Glumetza	1,345	374.93	504.28
Granisetron HCl	41,572	56.14	2,333.64
H.P. Acthar	2,021	41,533.21	83,938.62
Herceptin	53,608	2,620.58	140,483.85
Humalog	626,112	260.70	163,225.00
Humira	127,339	2,613.33	332,779.41
Hydroxychloroquine Sulfate	373,650	12.61	4,711.37
Invega	423,737	1,038.37	439,996.34
Isentress	204,795	1,070.59	219,251.61
Lantus	2,690,587	252.86	680,347.46
Latuda	250,199	626.14	156,660.75
Lyrica	1,002,207	246.66	247,204.86
Mestinon	8,592	217.22	1,866.40
Methylphenidate ER	3,456,299	167.39	578,534.69
Morphine Sulfate	518,903	54.14	28,093.10
Naproxen Sodium	319,877	9.79	3,132.20
Neulasta	72,410	3,107.82	225,037.00
Norditropin Flexpro	40,357	2,970.33	119,873.51
Novoseven RT	3,447	63,685.57	219,524.14
Phenergan	9,770	20.86	203.82
Prezista	223,170	1,092.12	243,728.80
Proair HFA	5,404,529	52.91	285,949.65
Proctosol-HC	87,127	11.49	1,001.15

Pulmozyme	64,509	2,764.88	178,359.67
Quelicin	22,785	68.93	1,570.62
Remicade	42,768	3,022.90	129,283.31
Retin-A Micro	25,081	417.39	10,468.57
Revlimid	10,670	8,842.62	94,350.72
Reyataz	228,462	1,100.65	251,457.68
Sabril	10,120	6,306.84	63,825.23
Seroquel XR	751,376	551.57	414,436.25
Sovaldi	144	28,167.67	4,056.14
Spiriva	1,089,524	278.01	302,903.95
Stribild	38,611	2,384.84	92,080.87
Suboxone	1,426,840	256.97	366,652.84
Symbicort	858,102	234.30	201,057.26
Synagis	174,691	2,215.36	387,004.17
Tecfidera	7,213	4,534.59	32,708.03
Tivicay	2,908	1,322.77	3,846.61
Truvada	423,082	1,234.59	522,333.51
Ventolin HFA	5,331,556	43.73	233,146.29
Vyvanse	3,078,059	181.69	559,256.43
Xifaxan	60,711	1,141.70	69,313.95
Xolair	38,655	2,306.19	89,145.79

Do you want to plot the top 10 values (yes/no)? yes





Enter a year to process ('q' to terminate): q

## Grading Rubrics

### General Requirements:

\_\_0\_\_ (5 pts) Coding Standard 1-9  
(descriptive comments, function headers, etc...)

### Implementation:

\_\_0\_\_ (7 pts) read\_data function test  
 \_\_0\_\_ (7 pts) get\_year\_list function test  
 \_\_0\_\_ (7 pts) top\_ten\_list function test  
 \_\_0\_\_ (6 pts) Pass Test1  
 \_\_0\_\_ (6 pts) Pass Test2  
 \_\_0\_\_ (6 pts) Pass Test3 (Plot Test)  
 \_\_0\_\_ (6 pts) Pass Test4 (Blind Test)