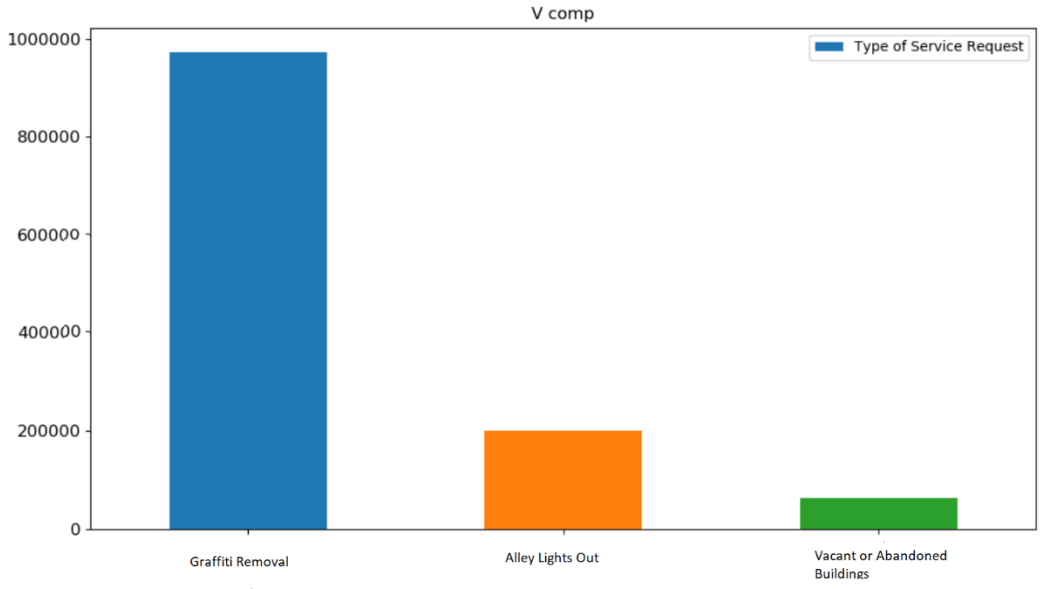
1) See hwk1.py

2)



Top 10 Dates for Vacant/Abandoned Building Complaints			
Dates	Alley Light Out	Graffiti Removal	Vacant/Abandoned Building
08/15/2011	158	570	150
4/11/2011	176	588	145
4/12/2011	146	467	143
02/15/2011	446	645	141
7/5/2011	137	736	121
06/30/2011	122	456	121
06/24/2011	98	562	118
05/19/2011	142	526	115
7/8/2011	165	479	115
07/19/2011	156	565	110

Top 10 Dates for Graffiti Removal Complaints			
Dates	Alley Light Out	Graffiti Removal	Vacant/Abandoned Building
03/18/2015	82	1282	26
09/25/2017	109	1226	13
09/26/2017	102	1152	14
02/23/2011	268	991	53

01/20/2015	86	954	10
03/19/2013	64	900	21
7/6/2011	152	900	85
03/18/2013	55	888	24
1/11/2011	88	884	38
06/21/2011	125	874	76

Top 10 dates for Alley Lights Out complaints			
Dates	Alley Light Out	Graffiti Removal	Vacant/Abandoned Building
02/15/2011	446	645	141
02/14/2011	446	509	29
02/16/2011	426	723	34
3/8/2011	403	848	43
3/2/2011	401	656	53
02/17/2011	392	673	67
3/1/2011	374	826	52
3/3/2011	349	738	44
02/18/2011	337	468	48
02/24/2011	330	790	31

Top 10 Addresses for Vacant/Abandoned Buildings			
Address	Alley Light Out	Graffiti Removal	Vacant/Abandoned Building
4301 S CHRISTIANA AVE	0	131	21
2022 W 68TH PL	2	0	18
11115 S EGGLESTON AVE	1	0	18
7634 S ST LAWRENCE AVE	0	0	16
3115 W 41ST PL	0	11	15
6348 S HOYNE AVE	0	0	14
3022 N LOTUS AVE	0	2	13
4926 S MARSHFIELD AVE	0	0	13
9008 S WOODLAWN AVE	0	0	13
107 W 113TH ST	0	0	12

Top 10 Addresses for Graffiti Removal			
Address	Alley Light Out	Graffiti Removal	Vacant/Abandoned Building

5700 S KENTON AVE	0	289	0
4472 S ARCHER AVE	1	272	0
4573 S ARCHER AVE	0	270	0
5109 S PULASKI RD	0	255	0
5111 S PULASKI RD	0	240	0
1400 N MILWAUKEE AVE	0	223	0
3124 W 47TH ST	0	220	1
5000 N ELSTON AVE	0	201	0
3710 S WESTERN AVE	0	196	1
1372 N MILWAUKEE AVE	0	196	0

Top 10 addresses for Alley Lights Out			
Address	Alley Light Out	Graffiti Removal	Vacant/Abandoned Building
2747 N LARAMIE AVE	80	55	0
5201 W DIVERSEY AVE	74	59	0
2745 E 130TH ST	71	0	0
4126 W JACKSON BLVD	63	0	6
3830 N ODELL AVE	61	0	0
3107 E 132ND ST	52	0	0
10801 S WOOD ST	52	0	0
9554 S DOBSON AVE	50	1	0
7917 S CRANDON AVE	50	0	0
13352 S BRANDON AVE	49	0	0

Top 10 Response Times (Days) for Graffiti Removal, Vacant and Abandoned Buildings Dropped due to lack of Completion Date		
Response Time (Days)	Alley Light Out	Graffiti Removal
0	38540	448825
1	15963	207133
2	7813	60903
3	6092	55994
4	5309	32849
5	4749	20594

6	4631	16877
7	4799	14743
8	4018	11031
9	3250	7952

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3)

a) Interesting thing 1, Vacant and Abandoned Buildings do not have a completion date listed – perhaps because they are too intensive a job to have a definite and rapid response time

b) Interesting thing 2, Graffiti Removal is the most common complaint registered with the 311 call system, followed by Alley Lights Out, then followed by Vacant and Abandoned Buildings. There is a significant gulf in number of calls between each.

c) Interesting thing 3, there doesn't seem to be much correlation between address and any of the three complaints. In most cases, an address that commonly calls for one type of complaint rarely seems to call for another. Not much overlap, perhaps?

d) Interesting thing 4, the city seems to have a pretty good response time, given that the top response time for both graffiti removal and alley lights out is 0, with each successive top response time being an increment greater than the prior.

e) Interesting thing 5, dates with a high concentration call for either vacant and abandoned buildings or alley lights out also seem to have a high concentration of calls for graffiti removal. It's also possible that since there are so many calls for graffiti removal, there is just generally a large number of calls on any given day for graffiti removal.

Problem 2)

Statistics based on past 90 days of 311 calls, for Vacant/Abandoned Buildings and Alley Lights Out calls

	Household Income in Past 12 Months	Estimate of Black Population	Estimate of White Population
Sum for Alley Lights Out	33431	34391	46680
Sum for Vacant/Abandoned B	6930	12693	5165
Average for Alley Lights Out	457.9589041	471.109589	639.4520548
Average for Vacant/Abandon	407.6470588	746.6470588	303.8235294

1) Based on the past 90 days, areas with a higher estimate for the population of black citizens than white citizens report Vacant and Abandoned Buildings. In some cases, these calls originate in areas where there is estimated to be a population of black citizens but no estimated white population.

   Furthermore, the average household income over the past 12 months for addresses that registered Vacant/Abandoned Buildings is lower than that for Alleys Lights Out. This suggests that areas that report Vacant/Abandoned Buildings may be in lower income areas, which would correspond to the notion that these are reports of vacant and abandoned buildings.

   Taken in conjunction with the notion that there are more black citizens or indeed only black citizens in these areas, it is possible that there is correlation between race, household income and incidence of calls reporting vacant or abandoned buildings.

2) Based on the past 90 days, there is no seeming direct correlation between race and incidence of alley lights out being reported at an address. In some cases, areas with a predominantly black population will report alley lights out, while in others areas with a predominantly white population will report alley lights out. In contrast to vacant and abandoned buildings, there are even cases in which there is a notable white population but a low or non-existent black population.

   Furthermore, the average household income over the past 12 months for addresses that registered alley lights out complaints is greater than for vacant/abandoned buildings. This suggests that alley lights out is either an issue that plagues areas at multiple levels of income or simply slightly higher income areas that vacant/abandoned buildings.

   Taken together, there seems to be no direct correlation between race and whether an area will report an alley lights out complaint.

3) There appears to be no change in either reports of vacant/abandoned buildings or alley lights out complaints. Though the numbers fluctuate, there is not a consistent pattern suggesting that time will impact the incidence of these reports, at least over this 3 month period.
4) To conclude, alley lights out complaints seem to originate in overall higher income communities, without a preference for either black or white populations. Notably, alley lights out occurs in areas with an estimated black or white population but without an

estimated population of their converse. This suggests that there is not a strong relationship between race and alley lights complaints, but possibly one with income.

In contrast, vacant and abandoned buildings seem to originate in overall low income communities, with a preference for largely black populations. It is notable that in some cases, these addresses originate in areas that possess a relatively high black population but little to no estimated white population. This suggests that there is a link between race, income and incidence of reporting a vacant or abandoned building.

Problem 3)

a)

Alley Light Out	Graffiti Removal	Vacant/Abandoned Building
3600 W ROOSEVELT RD	0	4	0

The request is most likely to be a graffiti removal request, with a 100% probability. As such, the other two 311 requests have a 0% chance.

b)

Community Area	Alley Light Out	Graffiti Removal	Vacant/Abandoned Building
3	1314	13986	119
26	1711	1553	1774
27	1618	2568	1314
26+27	3329	4121	3088

Community Area 3 is Uptown, while Community Areas 26 and 27 are West and East Garfield Park respectively.

It is more likely to come from Uptown than Garfield Park.

4121 + 13986 = 18107

4121/18107 = 23%

13986/18107 = 77%

It is about 54% more likely to come from Uptown than Garfield Park.

c) Given that there is a total number of calls about Graffiti Removal of 260, then it follows that the % chance of getting a call from Garfield Park is 100/260 or 38.5% and the % chance of getting a call from Uptown is 160/260 or 61.5%. Hence, there is 61.5 – 38.5 = 23, 23% less chance that it is a call from Garfield Park than Uptown.