Problem 1.1

Iteration = 10

```
        team_name          w
0   Mary Hardin-Baylor  0.000898
1            Clemson  0.000485
2         Mount Union  0.000579
3         Morningside  0.000938
4     North Dakota St  0.000547
5         Valdosta St  0.009898
6        St John's MN  0.000683
7            Alabama  0.000369
8       UW-Whitewater  0.002500
9           Ferris St  0.000402
10      Johns Hopkins  0.001216
11       Brockport St  0.001377
12          Princeton  0.000178
13    Minn St-Mankato  0.001645
14     Benedictine KS  0.000523
15    Kansas Wesleyan  0.001447
16         Ohio State  0.000066
17          Marian IN  0.000647
18          Bethel MN  0.000010
19        Muhlenberg  0.000372
20        Tarleton St  0.000071
21   Ouachita Baptist  0.000152
22           Georgia  0.003222
23         Notre Dame  0.000069
24      Notre Dame OH  0.000877
```

Iteration =100

```
        team_name          w
0   Mary Hardin-Baylor  0.000445
1            Clemson  0.000245
2            Alabama  0.000140
3         Mount Union  0.000904
4        St John's MN  0.000768
5         Morningside  0.027211
6         Valdosta St  0.000291
7     North Dakota St  0.000189
8            Georgia  0.002526
9          Ohio State  0.000238
10         Notre Dame  0.000725
11      UW-Whitewater  0.000229
12          Ferris St  0.000234
13           Oklahoma  0.000788
14      Johns Hopkins  0.000362
15           Texas A&M  0.000800
16               LSU  0.000017
17            Florida  0.000240
18           Kentucky  0.000004
```

```
19            Texas  0.000097
20         Michigan  0.000029
21         Syracuse  0.000069
22   Central Florida  0.003145
23     Washington St  0.000016
24        Washington  0.000511
```

Iteration = 1000

```
            team_name         w
0            Clemson  0.000577
1            Alabama  0.000061
2            Georgia  0.000024
3         Ohio State  0.001586
4         Notre Dame  0.001427
5           Oklahoma  0.053666
6          Texas A&M  0.000241
7                LSU  0.000178
8            Florida  0.004716
9      North Dakota St  0.000348
10          Kentucky  0.000207
11             Texas  0.000040
12          Michigan  0.000044
13          Syracuse  0.000520
14   Central Florida  0.000076
15  Mary Hardin-Baylor  0.000106
16        Washington  0.000002
17     Washington St  0.000034
18        Penn State  0.000001
19            Auburn  0.000017
20          Missouri  0.000005
21              Iowa  0.000014
22      Northwestern  0.003145
23     West Virginia  0.000003
24          Fresno St  0.000153
```
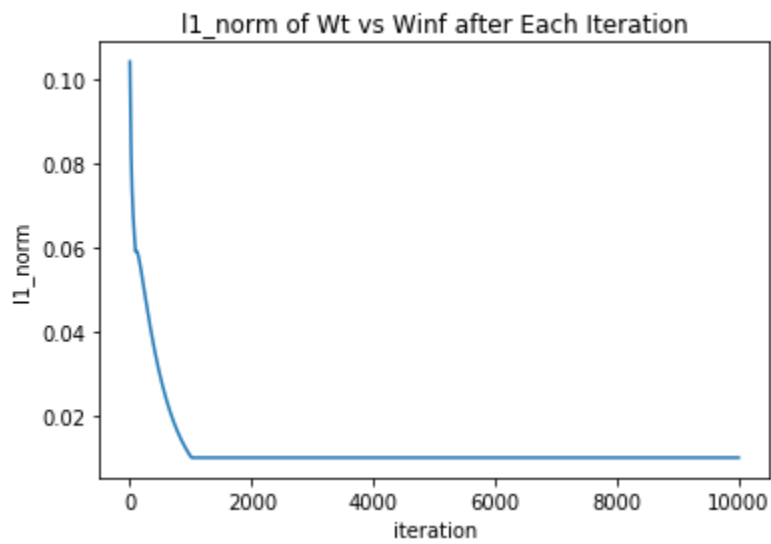
Iteration = 10000

```
            team_name              w
0            Clemson  6.020182e-04
1            Alabama  4.821643e-05
2            Georgia  3.179812e-06
3         Ohio State  1.682704e-03
4         Notre Dame  1.517526e-03
5           Oklahoma  5.722307e-02
6          Texas A&M  2.389311e-04
7                LSU  1.766860e-04
8            Florida  5.015543e-03
9      North Dakota St  3.655535e-04
10          Kentucky  1.702378e-04
11             Texas  5.837816e-06
12          Michigan  5.506202e-06
```
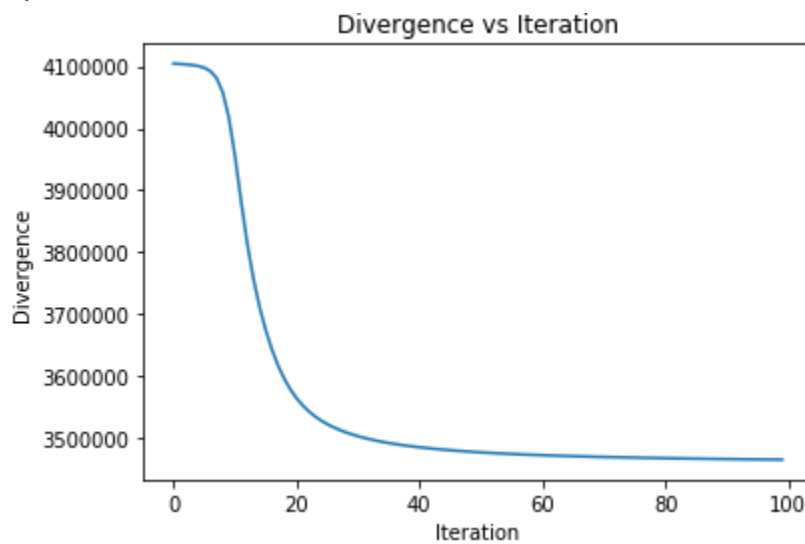
```
13              Syracuse   4.648239e-04
14       Central Florida   5.385880e-05
15            Washington   1.341459e-05
16         Washington St   3.085448e-07
17            Penn State   4.529434e-06
18                Auburn   1.150041e-06
19              Missouri   2.312651e-06
20                  Iowa   6.169053e-07
21          Northwestern   9.789275e-06
22         West Virginia   3.145499e-03
23             Fresno St   5.584810e-07
24        South Carolina   1.284052e-04
```

Question 1.2

l1_norm of Wt vs Winf after Each Iteration

Question 2.1

Divergence vs Iteration

Question 2.2

Rounded to nearest 4th decimal

Each words and their corresponding weights.

Col 1	Col2	Col3	Col4	Col5
pay 0.0227	music 0.0296	building 0.0216	family 0.0209	father 0.0622
money 0.0188	play 0.0130	build 0.0149	woman 0.0201	mrs 0.0606
state 0.0169	performance 0.0130	city 0.0143	child 0.0190	son 0.0583
bill 0.0126	perform 0.0127	space 0.0120	man 0.0177	graduate 0.0413
cost 0.0114	song 0.0124	house 0.0116	live 0.0146	daughter 0.0363
budget 0.0109	dance 0.0117	area 0.0116	life 0.0145	marry 0.0328
tax 0.0107	sound 0.0106	project 0.0112	friend 0.0136	degree 0.0286
law 0.0104	sing 0.0099	site 0.0105	home 0.0131	mother 0.0283
program 0.0102	concert 0.0092	construction 0.0083	young 0.0124	receive 0.0257
plan 0.0093	band 0.0091	owner 0.0082	wife 0.0115	ceremony 0.0212

Col 6	Col 7	Col 8	Col 9	Col 10
percent 0.0263	official 0.0137	case 0.0197	executive 0.0396	win 0.0221
market 0.0177	agreement 0.0109	lawyer 0.0178	president 0.0351	second 0.0220
price 0.0165	states 0.0095	court 0.0177	company 0.0221	third 0.0154
company 0.0139	meeting 0.0093	charge 0.0177	chief 0.0217	hit 0.0153
stock 0.0133	plan 0.0086	law 0.0144	director 0.0167	victory 0.0138
rate 0.0119	country 0.0086	judge 0.0118	chairman 0.0149	score 0.0113
share 0.0119	leader 0.0083	legal 0.0100	vice 0.0146	finish 0.0101
rise 0.0110	government 0.0073	investigation 0.0095	business 0.0141	beat 0.0100
sell 0.0106	american 0.0073	trial 0.0089	name 0.0134	race 0.0099
sale 0.0095	policy 0.0070	official 0.0084	yesterday 0.0125	fourth 0.0099

Col 11	Col 12	Col 13	Col 14	Col 15
health 0.0196	food 0.0133	art 0.0184	book 0.0136	war 0.0194
problem 0.0186	water 0.0094	artist 0.0123	write 0.0111	military 0.0178
medical 0.0130	restaurant 0.0080	museum 0.0096	editor 0.0103	government 0.0148
cause 0.0129	serve 0.0079	design 0.0090	history 0.0089	american 0.0137
doctor 0.0127	red 0.0075	collection 0.0089	world 0.0082	force 0.0124
patient 0.0120	small 0.0069	exhibition 0.0084	life 0.0081	states 0.0121
care 0.0115	eat 0.0069	photograph 0.0081	page 0.0072	attack 0.0117
treatment 0.0103	dry 0.0068	display 0.0074	author 0.0063	country 0.0117
report 0.0092	add 0.0064	painting 0.0070	great 0.0060	peace 0.0094
hospital 0.0092	green 0.0064	color 0.0065	view 0.0058	leader 0.0083

Col 16	Col 17	Col 18	Col 19	Col 20
company 0.0239	drug 0.0272	school 0.0360	team 0.0425	vote 0.0200
computer 0.0147	test 0.0174	student 0.0276	game 0.0360	political 0.0187
industry 0.0128	study 0.0172	child 0.0142	player 0.0296	campaign 0.0185
product 0.0123	woman 0.0112	class 0.0136	play 0.0290	republican 0.0149
technology 0.0119	research 0.0108	education 0.0133	season 0.0247	candidate 0.0142
sell 0.0108	report 0.0102	program 0.0132	coach 0.0159	election 0.0141
system 0.0096	researcher 0.0092	community 0.0121	league 0.0111	party 0.0135
customer 0.0094	evidence 0.0091	college 0.0119	point 0.0092	democratic 0.0117
market 0.0087	scientist 0.0082	teacher 0.0101	win 0.0089	state 0.0110
service 0.0079	disease 0.0079	group 0.0101	sport 0.0087	leader 0.0108

Col 21	Col 22	Col 23	Col 24	Col 25
thing 0.0250	film 0.0192	ask 0.0218	police 0.0170	keep 0.0107
lot 0.0191	character 0.0170	tell 0.0172	city 0.0155	far 0.0088
really 0.0162	movie 0.0170	question 0.0148	car 0.0143	bad 0.0082
feel 0.0146	play 0.0155	speak 0.0124	mile 0.0112	slow 0.0081
big 0.0135	television 0.0136	answer 0.0108	official 0.0105	cut 0.0077
kind 0.0116	story 0.0123	news 0.0104	fire 0.0101	move 0.0075
little 0.0103	novel 0.0092	reporter 0.0092	hour 0.0092	put 0.0074
great 0.0097	production 0.0087	letter 0.0083	street 0.0090	level 0.0073
hard 0.0090	write 0.0086	word 0.0081	area 0.0077	lose 0.0070
put 0.0089	star 0.0086	interview 0.0080	night 0.0076	problem 0.0069