

Assignment 5

Due at 11:59pm on November 28.

You may work in pairs or individually for this assignment. Make sure you join a group in Canvas if you are working in pairs. Turn in this assignment as an HTML or PDF file to ELMS. Make sure to include the R Markdown or Quarto file that was used to generate it. Include the GitHub link for the repository containing these files.

```
library(censusapi)
```

Attaching package: 'censusapi'

The following object is masked from 'package:methods':

```
getFunction
```

```
library(tidyverse)
```

```
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
```

```
v dplyr      1.1.4      v readr      2.1.4
v forcats    1.0.0      v stringr    1.5.1
v ggplot2    3.4.4      v tibble     3.2.1
v lubridate  1.9.3      v tidyr      1.3.0
v purrr      1.0.2
```

```
-- Conflicts ----- tidyverse_conflicts() --
```

```
x dplyr::filter() masks stats::filter()
```

```
x dplyr::lag()     masks stats::lag()
```

```
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become
```

```
library(magrittr)
```

Attaching package: 'magrittr'

The following object is masked from 'package:purrr':

```
set_names
```

The following object is masked from 'package:tidyr':

```
extract
```

```
library(factoextra)
```

Welcome! Want to learn more? See two factoextra-related books at <https://goo.gl/ve3WBa>

```
library(ggmap)
```

```
i Google's Terms of Service: <https://mapsplatform.google.com>
  Stadia Maps' Terms of Service: <https://stadiamaps.com/terms-of-service/>
  OpenStreetMap's Tile Usage Policy: <https://operations.osmfoundation.org/policies/tiles/>
i Please cite ggmap if you use it! Use `citation("ggmap")` for details.
```

Attaching package: 'ggmap'

The following object is masked from 'package:magrittr':

```
inset
```

Exploring ACS Data

In this notebook, we use the Census API to gather data from the American Community Survey (ACS). This requires an access key, which can be obtained here:

https://api.census.gov/data/key_signup.html

```
acs_il_c <- getCensus(name = "acs/acs5",
  vintage = 2016,
  vars = c("NAME", "B01003_001E", "B19013_001E", "B19301_001E"),
  region = "county:*",
  regionin = "state:17",
  key = '457e74535811f68ac33753e2d9107cb373e935d4') %>%
  rename(pop = B01003_001E,
    hh_income = B19013_001E,
    income = B19301_001E)

head(acs_il_c)
```

	state	county	NAME	pop	hh_income	income
1	17	067	Hancock County, Illinois	18633	50077	25647
2	17	063	Grundy County, Illinois	50338	67162	30232
3	17	091	Kankakee County, Illinois	111493	54697	25111
4	17	043	DuPage County, Illinois	930514	81521	40547
5	17	003	Alexander County, Illinois	7051	29071	16067
6	17	129	Menard County, Illinois	12576	60420	31323

Pull map data for Illinois into a data frame.

```
il_map <- map_data("county", region = "illinois")
head(il_map)
```

	long	lat	group	order	region	subregion
1	-91.49563	40.21018	1	1	illinois	adams
2	-90.91121	40.19299	1	2	illinois	adams
3	-90.91121	40.19299	1	3	illinois	adams
4	-90.91121	40.10704	1	4	illinois	adams
5	-90.91121	39.83775	1	5	illinois	adams
6	-90.91694	39.75754	1	6	illinois	adams

Join the ACS data with the map data. Not that `il_map` has a column `subregion` which includes county names. We need a corresponding variable in the ACS data to join both data sets. This needs some transformations, among which the function `tolower()` might be useful. Call the joined data `acs_map`.

```
acs_il_c$county_name <- tolower(sapply(strsplit(acs_il_c$NAME, ","), `[, 1]`))
acs_il_c$county_name <- gsub(" county", "", acs_il_c$county_name)
```

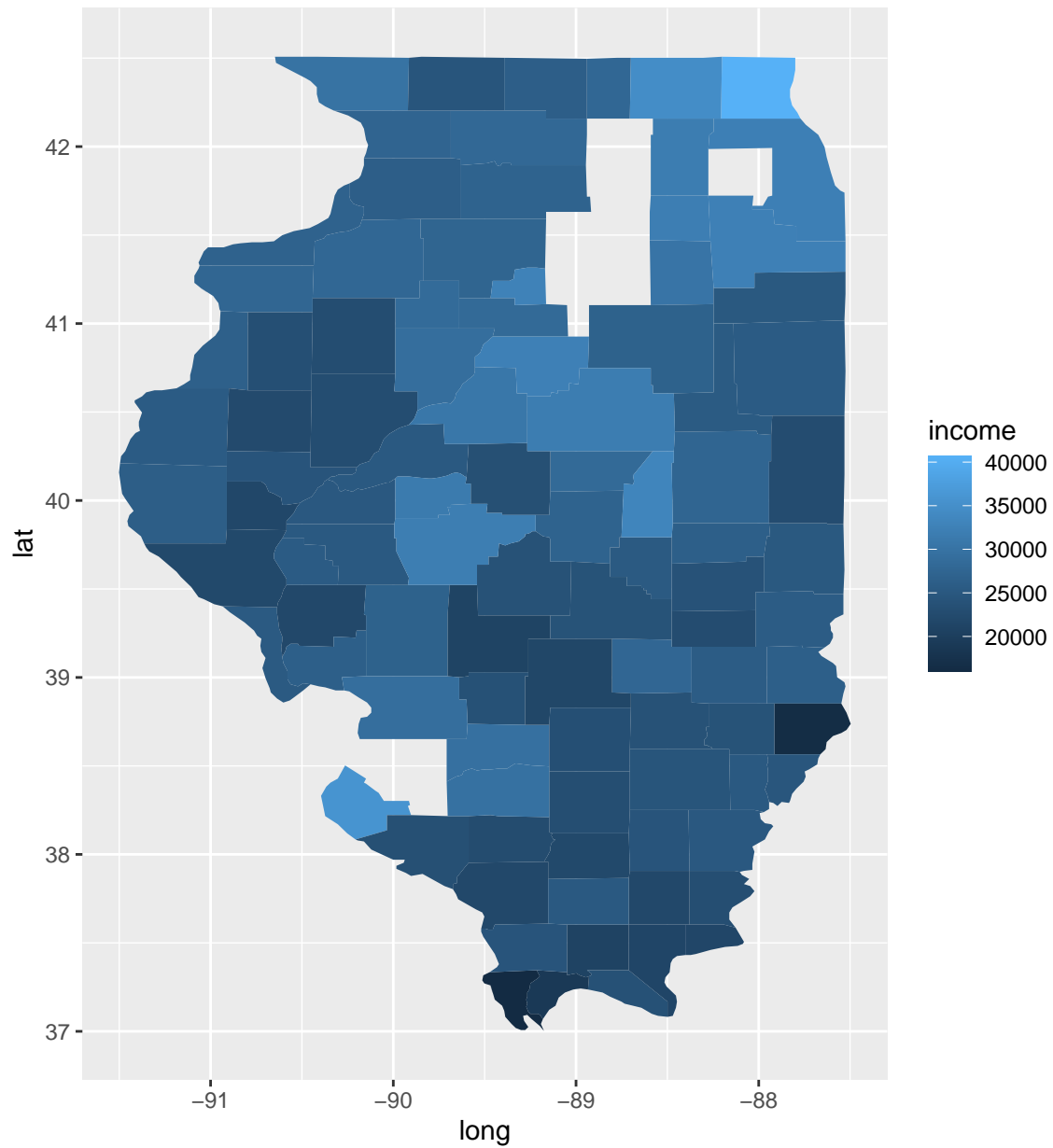
```
acs_map <- left_join(acs_il_c, il_map, by = c("county_name" = "subregion"))
head(acs_map)
```

	state	county		NAME	pop	hh_income	income	county_name
1	17	067	Hancock County, Illinois	18633	50077	25647	hancock	
2	17	067	Hancock County, Illinois	18633	50077	25647	hancock	
3	17	067	Hancock County, Illinois	18633	50077	25647	hancock	
4	17	067	Hancock County, Illinois	18633	50077	25647	hancock	
5	17	067	Hancock County, Illinois	18633	50077	25647	hancock	
6	17	067	Hancock County, Illinois	18633	50077	25647	hancock	

	long	lat	group	order	region
1	-91.18623	40.63417	34	573	illinois
2	-90.89976	40.63417	34	574	illinois
3	-90.91121	40.27893	34	575	illinois
4	-90.91121	40.19299	34	576	illinois
5	-91.49563	40.21018	34	577	illinois
6	-91.48990	40.25029	34	578	illinois

After you do this, plot a map of Illinois with Counties colored by per capita income.

```
ggplot(acs_map) +
  geom_polygon(aes(x = long, y = lat, group = group, fill = income))
```



Hierarchical Clustering

We want to find clusters of counties that are similar in their population, average household income and per capita income. First, clean the data so that you have the appropriate variables to use for clustering. Next, create the distance matrix of the cleaned data. This distance matrix can be used to cluster counties, e.g. using the ward method.

```

acs_map$pop <- as.numeric(acs_map$pop)
acs_map$hh_income <- as.numeric(acs_map$hh_income)
acs_map$income <- as.numeric(acs_map$income)

acs_map <- na.omit(acs_map)

# hclust_data <-
#   acs_map %>%
#   select(pop, hh_income, income) %>%
#   mutate_all(scale)
hclust_data <- acs_map[, c("pop", "hh_income", "income")]

hclust_d <- dist(hclust_data)
hc_ward <- hclust(hclust_d, method = "ward.D2")

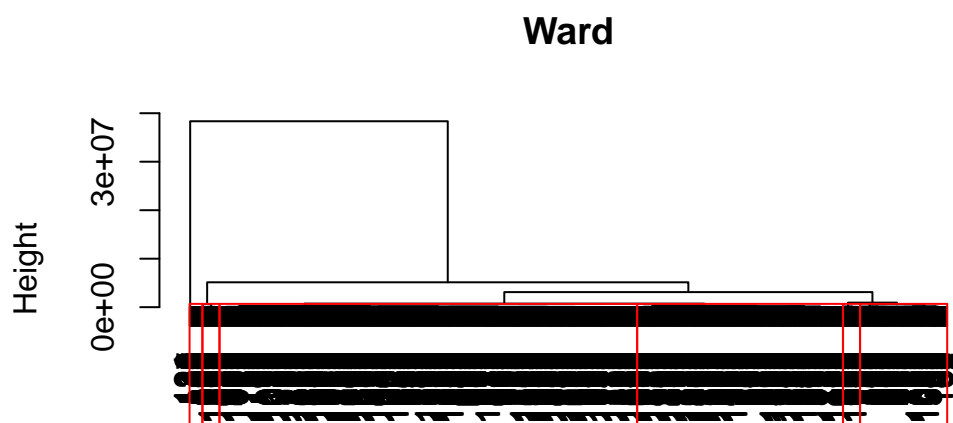
```

Plot the dendrogram to find a reasonable number of clusters. Draw boxes around the clusters of your cluster solution.

```

#We want to create six clusters based on the hc_ward
plot(hc_ward, main = "Ward", xlab = "", sub = "")
rect.hclust(hc_ward,
            k = 6,
            border = "red")

```



```
clusters <- cutree(hc_ward, 6)
```

Visualize the county clusters on a map. For this task, create a new `acs_map` object that now also includes cluster membership as a new column. This column should be called `cluster`.

```
acs_map %>%  
  mutate(cluster = cutree(hc_ward, 6))
```

	state	county	NAME	pop	hh_income	income
1	17	067	Hancock County, Illinois	18633	50077	25647
2	17	067	Hancock County, Illinois	18633	50077	25647
3	17	067	Hancock County, Illinois	18633	50077	25647
4	17	067	Hancock County, Illinois	18633	50077	25647
5	17	067	Hancock County, Illinois	18633	50077	25647
6	17	067	Hancock County, Illinois	18633	50077	25647
7	17	067	Hancock County, Illinois	18633	50077	25647
8	17	067	Hancock County, Illinois	18633	50077	25647
9	17	067	Hancock County, Illinois	18633	50077	25647
10	17	067	Hancock County, Illinois	18633	50077	25647
11	17	067	Hancock County, Illinois	18633	50077	25647
12	17	067	Hancock County, Illinois	18633	50077	25647
13	17	067	Hancock County, Illinois	18633	50077	25647

14	17	067	Hancock County, Illinois	18633	50077	25647
15	17	067	Hancock County, Illinois	18633	50077	25647
16	17	067	Hancock County, Illinois	18633	50077	25647
17	17	067	Hancock County, Illinois	18633	50077	25647
18	17	067	Hancock County, Illinois	18633	50077	25647
19	17	067	Hancock County, Illinois	18633	50077	25647
20	17	067	Hancock County, Illinois	18633	50077	25647
21	17	067	Hancock County, Illinois	18633	50077	25647
22	17	063	Grundy County, Illinois	50338	67162	30232
23	17	063	Grundy County, Illinois	50338	67162	30232
24	17	063	Grundy County, Illinois	50338	67162	30232
25	17	063	Grundy County, Illinois	50338	67162	30232
26	17	063	Grundy County, Illinois	50338	67162	30232
27	17	063	Grundy County, Illinois	50338	67162	30232
28	17	091	Kankakee County, Illinois	111493	54697	25111
29	17	091	Kankakee County, Illinois	111493	54697	25111
30	17	091	Kankakee County, Illinois	111493	54697	25111
31	17	091	Kankakee County, Illinois	111493	54697	25111
32	17	091	Kankakee County, Illinois	111493	54697	25111
33	17	091	Kankakee County, Illinois	111493	54697	25111
34	17	091	Kankakee County, Illinois	111493	54697	25111
35	17	091	Kankakee County, Illinois	111493	54697	25111
36	17	091	Kankakee County, Illinois	111493	54697	25111
37	17	091	Kankakee County, Illinois	111493	54697	25111
39	17	003	Alexander County, Illinois	7051	29071	16067
40	17	003	Alexander County, Illinois	7051	29071	16067
41	17	003	Alexander County, Illinois	7051	29071	16067
42	17	003	Alexander County, Illinois	7051	29071	16067
43	17	003	Alexander County, Illinois	7051	29071	16067
44	17	003	Alexander County, Illinois	7051	29071	16067
45	17	003	Alexander County, Illinois	7051	29071	16067
46	17	003	Alexander County, Illinois	7051	29071	16067
47	17	003	Alexander County, Illinois	7051	29071	16067
48	17	003	Alexander County, Illinois	7051	29071	16067
49	17	003	Alexander County, Illinois	7051	29071	16067
50	17	003	Alexander County, Illinois	7051	29071	16067
51	17	003	Alexander County, Illinois	7051	29071	16067
52	17	003	Alexander County, Illinois	7051	29071	16067
53	17	003	Alexander County, Illinois	7051	29071	16067
54	17	003	Alexander County, Illinois	7051	29071	16067
55	17	003	Alexander County, Illinois	7051	29071	16067
56	17	003	Alexander County, Illinois	7051	29071	16067
57	17	003	Alexander County, Illinois	7051	29071	16067

58	17	003	Alexander County, Illinois	7051	29071	16067
59	17	003	Alexander County, Illinois	7051	29071	16067
60	17	003	Alexander County, Illinois	7051	29071	16067
61	17	003	Alexander County, Illinois	7051	29071	16067
62	17	003	Alexander County, Illinois	7051	29071	16067
63	17	003	Alexander County, Illinois	7051	29071	16067
64	17	003	Alexander County, Illinois	7051	29071	16067
65	17	003	Alexander County, Illinois	7051	29071	16067
66	17	003	Alexander County, Illinois	7051	29071	16067
67	17	003	Alexander County, Illinois	7051	29071	16067
68	17	003	Alexander County, Illinois	7051	29071	16067
69	17	003	Alexander County, Illinois	7051	29071	16067
70	17	003	Alexander County, Illinois	7051	29071	16067
71	17	003	Alexander County, Illinois	7051	29071	16067
72	17	003	Alexander County, Illinois	7051	29071	16067
73	17	003	Alexander County, Illinois	7051	29071	16067
74	17	003	Alexander County, Illinois	7051	29071	16067
75	17	003	Alexander County, Illinois	7051	29071	16067
76	17	003	Alexander County, Illinois	7051	29071	16067
77	17	003	Alexander County, Illinois	7051	29071	16067
78	17	003	Alexander County, Illinois	7051	29071	16067
79	17	129	Menard County, Illinois	12576	60420	31323
80	17	129	Menard County, Illinois	12576	60420	31323
81	17	129	Menard County, Illinois	12576	60420	31323
82	17	129	Menard County, Illinois	12576	60420	31323
83	17	129	Menard County, Illinois	12576	60420	31323
84	17	129	Menard County, Illinois	12576	60420	31323
85	17	129	Menard County, Illinois	12576	60420	31323
86	17	129	Menard County, Illinois	12576	60420	31323
87	17	129	Menard County, Illinois	12576	60420	31323
88	17	129	Menard County, Illinois	12576	60420	31323
89	17	129	Menard County, Illinois	12576	60420	31323
90	17	129	Menard County, Illinois	12576	60420	31323
91	17	129	Menard County, Illinois	12576	60420	31323
92	17	129	Menard County, Illinois	12576	60420	31323
93	17	129	Menard County, Illinois	12576	60420	31323
94	17	129	Menard County, Illinois	12576	60420	31323
95	17	129	Menard County, Illinois	12576	60420	31323
96	17	129	Menard County, Illinois	12576	60420	31323
97	17	129	Menard County, Illinois	12576	60420	31323
98	17	129	Menard County, Illinois	12576	60420	31323
99	17	129	Menard County, Illinois	12576	60420	31323
100	17	129	Menard County, Illinois	12576	60420	31323

101	17	129	Menard County, Illinois	12576	60420	31323
102	17	129	Menard County, Illinois	12576	60420	31323
104	17	031	Cook County, Illinois	5227575	56902	32179
105	17	031	Cook County, Illinois	5227575	56902	32179
106	17	031	Cook County, Illinois	5227575	56902	32179
107	17	031	Cook County, Illinois	5227575	56902	32179
108	17	031	Cook County, Illinois	5227575	56902	32179
109	17	031	Cook County, Illinois	5227575	56902	32179
110	17	031	Cook County, Illinois	5227575	56902	32179
111	17	031	Cook County, Illinois	5227575	56902	32179
112	17	031	Cook County, Illinois	5227575	56902	32179
113	17	031	Cook County, Illinois	5227575	56902	32179
114	17	031	Cook County, Illinois	5227575	56902	32179
115	17	031	Cook County, Illinois	5227575	56902	32179
116	17	031	Cook County, Illinois	5227575	56902	32179
117	17	031	Cook County, Illinois	5227575	56902	32179
118	17	031	Cook County, Illinois	5227575	56902	32179
119	17	031	Cook County, Illinois	5227575	56902	32179
120	17	031	Cook County, Illinois	5227575	56902	32179
121	17	031	Cook County, Illinois	5227575	56902	32179
122	17	031	Cook County, Illinois	5227575	56902	32179
123	17	031	Cook County, Illinois	5227575	56902	32179
124	17	031	Cook County, Illinois	5227575	56902	32179
125	17	031	Cook County, Illinois	5227575	56902	32179
126	17	031	Cook County, Illinois	5227575	56902	32179
127	17	031	Cook County, Illinois	5227575	56902	32179
128	17	031	Cook County, Illinois	5227575	56902	32179
129	17	031	Cook County, Illinois	5227575	56902	32179
130	17	031	Cook County, Illinois	5227575	56902	32179
131	17	031	Cook County, Illinois	5227575	56902	32179
132	17	115	Macon County, Illinois	108404	47477	27010
133	17	115	Macon County, Illinois	108404	47477	27010
134	17	115	Macon County, Illinois	108404	47477	27010
135	17	115	Macon County, Illinois	108404	47477	27010
136	17	115	Macon County, Illinois	108404	47477	27010
137	17	115	Macon County, Illinois	108404	47477	27010
138	17	115	Macon County, Illinois	108404	47477	27010
139	17	115	Macon County, Illinois	108404	47477	27010
140	17	115	Macon County, Illinois	108404	47477	27010
141	17	115	Macon County, Illinois	108404	47477	27010
142	17	115	Macon County, Illinois	108404	47477	27010
143	17	115	Macon County, Illinois	108404	47477	27010
144	17	115	Macon County, Illinois	108404	47477	27010

145	17	115	Macon County, Illinois	108404	47477	27010
146	17	115	Macon County, Illinois	108404	47477	27010
147	17	115	Macon County, Illinois	108404	47477	27010
148	17	137	Morgan County, Illinois	34801	47760	25201
149	17	137	Morgan County, Illinois	34801	47760	25201
150	17	137	Morgan County, Illinois	34801	47760	25201
151	17	137	Morgan County, Illinois	34801	47760	25201
152	17	137	Morgan County, Illinois	34801	47760	25201
153	17	137	Morgan County, Illinois	34801	47760	25201
154	17	137	Morgan County, Illinois	34801	47760	25201
155	17	137	Morgan County, Illinois	34801	47760	25201
156	17	137	Morgan County, Illinois	34801	47760	25201
157	17	137	Morgan County, Illinois	34801	47760	25201
158	17	137	Morgan County, Illinois	34801	47760	25201
159	17	137	Morgan County, Illinois	34801	47760	25201
160	17	137	Morgan County, Illinois	34801	47760	25201
161	17	137	Morgan County, Illinois	34801	47760	25201
162	17	137	Morgan County, Illinois	34801	47760	25201
163	17	137	Morgan County, Illinois	34801	47760	25201
164	17	137	Morgan County, Illinois	34801	47760	25201
165	17	137	Morgan County, Illinois	34801	47760	25201
166	17	137	Morgan County, Illinois	34801	47760	25201
167	17	191	Wayne County, Illinois	16517	46903	24342
168	17	191	Wayne County, Illinois	16517	46903	24342
169	17	191	Wayne County, Illinois	16517	46903	24342
170	17	191	Wayne County, Illinois	16517	46903	24342
171	17	191	Wayne County, Illinois	16517	46903	24342
172	17	191	Wayne County, Illinois	16517	46903	24342
173	17	191	Wayne County, Illinois	16517	46903	24342
174	17	191	Wayne County, Illinois	16517	46903	24342
175	17	191	Wayne County, Illinois	16517	46903	24342
176	17	203	Woodford County, Illinois	39123	68040	32360
177	17	203	Woodford County, Illinois	39123	68040	32360
178	17	203	Woodford County, Illinois	39123	68040	32360
179	17	203	Woodford County, Illinois	39123	68040	32360
180	17	203	Woodford County, Illinois	39123	68040	32360
181	17	203	Woodford County, Illinois	39123	68040	32360
182	17	203	Woodford County, Illinois	39123	68040	32360
183	17	203	Woodford County, Illinois	39123	68040	32360
184	17	203	Woodford County, Illinois	39123	68040	32360
185	17	203	Woodford County, Illinois	39123	68040	32360
186	17	203	Woodford County, Illinois	39123	68040	32360
187	17	203	Woodford County, Illinois	39123	68040	32360

188	17	203	Woodford County, Illinois	39123	68040	32360
189	17	203	Woodford County, Illinois	39123	68040	32360
190	17	203	Woodford County, Illinois	39123	68040	32360
191	17	203	Woodford County, Illinois	39123	68040	32360
192	17	203	Woodford County, Illinois	39123	68040	32360
193	17	203	Woodford County, Illinois	39123	68040	32360
194	17	203	Woodford County, Illinois	39123	68040	32360
195	17	203	Woodford County, Illinois	39123	68040	32360
196	17	203	Woodford County, Illinois	39123	68040	32360
197	17	203	Woodford County, Illinois	39123	68040	32360
198	17	055	Franklin County, Illinois	39503	39507	22119
199	17	055	Franklin County, Illinois	39503	39507	22119
200	17	055	Franklin County, Illinois	39503	39507	22119
201	17	055	Franklin County, Illinois	39503	39507	22119
202	17	055	Franklin County, Illinois	39503	39507	22119
203	17	055	Franklin County, Illinois	39503	39507	22119
204	17	055	Franklin County, Illinois	39503	39507	22119
205	17	055	Franklin County, Illinois	39503	39507	22119
206	17	055	Franklin County, Illinois	39503	39507	22119
207	17	055	Franklin County, Illinois	39503	39507	22119
208	17	055	Franklin County, Illinois	39503	39507	22119
209	17	055	Franklin County, Illinois	39503	39507	22119
210	17	055	Franklin County, Illinois	39503	39507	22119
211	17	055	Franklin County, Illinois	39503	39507	22119
212	17	055	Franklin County, Illinois	39503	39507	22119
213	17	055	Franklin County, Illinois	39503	39507	22119
214	17	109	McDonough County, Illinois	31727	41484	22387
215	17	109	McDonough County, Illinois	31727	41484	22387
216	17	109	McDonough County, Illinois	31727	41484	22387
217	17	109	McDonough County, Illinois	31727	41484	22387
218	17	109	McDonough County, Illinois	31727	41484	22387
219	17	109	McDonough County, Illinois	31727	41484	22387
220	17	111	McHenry County, Illinois	307083	79836	34589
221	17	111	McHenry County, Illinois	307083	79836	34589
222	17	111	McHenry County, Illinois	307083	79836	34589
223	17	111	McHenry County, Illinois	307083	79836	34589
224	17	111	McHenry County, Illinois	307083	79836	34589
225	17	111	McHenry County, Illinois	307083	79836	34589
226	17	111	McHenry County, Illinois	307083	79836	34589
227	17	111	McHenry County, Illinois	307083	79836	34589
228	17	139	Moultrie County, Illinois	14915	51432	25351
229	17	139	Moultrie County, Illinois	14915	51432	25351
230	17	139	Moultrie County, Illinois	14915	51432	25351

231	17	139	Moultrie County, Illinois	14915	51432	25351
232	17	139	Moultrie County, Illinois	14915	51432	25351
233	17	139	Moultrie County, Illinois	14915	51432	25351
234	17	139	Moultrie County, Illinois	14915	51432	25351
235	17	139	Moultrie County, Illinois	14915	51432	25351
236	17	139	Moultrie County, Illinois	14915	51432	25351
237	17	139	Moultrie County, Illinois	14915	51432	25351
238	17	139	Moultrie County, Illinois	14915	51432	25351
239	17	139	Moultrie County, Illinois	14915	51432	25351
240	17	139	Moultrie County, Illinois	14915	51432	25351
241	17	139	Moultrie County, Illinois	14915	51432	25351
242	17	139	Moultrie County, Illinois	14915	51432	25351
243	17	139	Moultrie County, Illinois	14915	51432	25351
244	17	139	Moultrie County, Illinois	14915	51432	25351
245	17	139	Moultrie County, Illinois	14915	51432	25351
246	17	139	Moultrie County, Illinois	14915	51432	25351
247	17	139	Moultrie County, Illinois	14915	51432	25351
248	17	145	Perry County, Illinois	21595	43308	22650
249	17	145	Perry County, Illinois	21595	43308	22650
250	17	145	Perry County, Illinois	21595	43308	22650
251	17	145	Perry County, Illinois	21595	43308	22650
252	17	145	Perry County, Illinois	21595	43308	22650
253	17	145	Perry County, Illinois	21595	43308	22650
254	17	145	Perry County, Illinois	21595	43308	22650
255	17	145	Perry County, Illinois	21595	43308	22650
256	17	145	Perry County, Illinois	21595	43308	22650
257	17	145	Perry County, Illinois	21595	43308	22650
258	17	145	Perry County, Illinois	21595	43308	22650
259	17	145	Perry County, Illinois	21595	43308	22650
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265	17	151	Pope County, Illinois	4255	39243	21427
266	17	151	Pope County, Illinois	4255	39243	21427
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317	17	013	Calhoun County, Illinois	4962	52949	25341

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366	17	085	Jo Daviess County, Illinois	22186	54702	29892
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386	17	101	Lawrence County, Illinois	16582	42650	16417
387	17	101	Lawrence County, Illinois	16582	42650	16417
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398	17	121	Marion County, Illinois	38503	43427	23366
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447	17	125	Mason County, Illinois	13931	43125	25166
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452	17	075	Iroquois County, Illinois	28814	47823	25562
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662	17	141	Ogle County, Illinois	52034	55832	28026
663	17	177	Stephenson County, Illinois	46283	45624	24529
664	17	177	Stephenson County, Illinois	46283	45624	24529
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669	17	177	Stephenson County, Illinois	46283	45624	24529
670	17	193	White County, Illinois	14410	43678	25065
671	17	193	White County, Illinois	14410	43678	25065
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704	17	113	McLean County, Illinois	173254	63420	31752

705	17	113	McLean County, Illinois	173254	63420	31752
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726	17	149	Pike County, Illinois	16054	40157	22048
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789	17	185	Wabash County, Illinois	11587	46871	24697
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822	17	089	Kane County, Illinois	526615	71602	31774
823	17	089	Kane County, Illinois	526615	71602	31774
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830	17	089	Kane County, Illinois	526615	71602	31774
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832	17	009	Brown County, Illinois	6836	52500	21822
833	17	009	Brown County, Illinois	6836	52500	21822

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847	17	009	Brown County, Illinois	6836	52500	21822
848	17	123	Marshall County, Illinois	12060	54189	28279
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859	17	021	Christian County, Illinois	33888	47417	23823
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865	17	021	Christian County, Illinois	33888	47417	23823
866	17	021	Christian County, Illinois	33888	47417	23823
867	17	021	Christian County, Illinois	33888	47417	23823
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881	17	021	Christian County, Illinois	33888	47417	23823
882	17	077	Jackson County, Illinois	59188	33845	21948
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903	17	181	Union County, Illinois	17458	45464	24296
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919	17	165	Saline County, Illinois	24659	40290	21917

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921	17	165	Saline County, Illinois	24659	40290	21917
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926	17	195	Whiteside County, Illinois	57155	49151	26155
927	17	195	Whiteside County, Illinois	57155	49151	26155
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942	17	195	Whiteside County, Illinois	57155	49151	26155
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945	17	079	Jasper County, Illinois	9592	56305	25811
946	17	079	Jasper County, Illinois	9592	56305	25811
947	17	079	Jasper County, Illinois	9592	56305	25811
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953	17	197	Will County, Illinois	685378	77507	32311
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967	17	197	Will County, Illinois	685378	77507	32311
968	17	041	Douglas County, Illinois	19770	52984	26309
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1005	17	069	Hardin County, Illinois	4173	39926	21573
1006	17	069	Hardin County, Illinois	4173	39926	21573

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1009	17	069	Hardin County, Illinois	4173	39926	21573
1010	17	069	Hardin County, Illinois	4173	39926	21573
1011	17	069	Hardin County, Illinois	4173	39926	21573
1012	17	069	Hardin County, Illinois	4173	39926	21573
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1014	17	069	Hardin County, Illinois	4173	39926	21573
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1017	17	069	Hardin County, Illinois	4173	39926	21573
1018	17	069	Hardin County, Illinois	4173	39926	21573
1019	17	095	Knox County, Illinois	51752	40605	22939
1020	17	095	Knox County, Illinois	51752	40605	22939
1021	17	095	Knox County, Illinois	51752	40605	22939
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1024	17	095	Knox County, Illinois	51752	40605	22939
1025	17	095	Knox County, Illinois	51752	40605	22939
1026	17	127	Massac County, Illinois	14883	42706	23673
1027	17	127	Massac County, Illinois	14883	42706	23673
1028	17	127	Massac County, Illinois	14883	42706	23673
1029	17	127	Massac County, Illinois	14883	42706	23673
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1039	17	127	Massac County, Illinois	14883	42706	23673
1040	17	127	Massac County, Illinois	14883	42706	23673
1041	17	127	Massac County, Illinois	14883	42706	23673
1042	17	179	Tazewell County, Illinois	135400	60178	30700
1043	17	179	Tazewell County, Illinois	135400	60178	30700
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1066	17	179	Tazewell County, Illinois	135400	60178	30700
1067	17	201	Winnebago County, Illinois	288896	49468	26187
1068	17	201	Winnebago County, Illinois	288896	49468	26187
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1074	17	201	Winnebago County, Illinois	288896	49468	26187
1075	17	147	Piatt County, Illinois	16469	69160	33197
1076	17	147	Piatt County, Illinois	16469	69160	33197
1077	17	147	Piatt County, Illinois	16469	69160	33197
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1081	17	147	Piatt County, Illinois	16469	69160	33197
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1086	17	147	Piatt County, Illinois	16469	69160	33197
1087	17	147	Piatt County, Illinois	16469	69160	33197
1088	17	153	Pulaski County, Illinois	5792	32538	18924
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1136	17	169	Schuyler County, Illinois	7205	48396	24323
1137	17	169	Schuyler County, Illinois	7205	48396	24323
1138	17	169	Schuyler County, Illinois	7205	48396	24323
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1149	17	175	Stark County, Illinois	5840	52058	28545
1150	17	175	Stark County, Illinois	5840	52058	28545
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1157	17	175	Stark County, Illinois	5840	52058	28545
1158	17	045	Edgar County, Illinois	17828	46440	25122
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1171	17	005	Bond County, Illinois	17137	52159	23660
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1182	17	007	Boone County, Illinois	53656	60063	27825
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1187	17	007	Boone County, Illinois	53656	60063	27825
1188	17	011	Bureau County, Illinois	33822	51425	27332
1189	17	011	Bureau County, Illinois	33822	51425	27332
1190	17	011	Bureau County, Illinois	33822	51425	27332
1191	17	011	Bureau County, Illinois	33822	51425	27332
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1199	17	011	Bureau County, Illinois	33822	51425	27332
1200	17	011	Bureau County, Illinois	33822	51425	27332
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1205	17	011	Bureau County, Illinois	33822	51425	27332
1206	17	015	Carroll County, Illinois	14793	50052	27325
1207	17	015	Carroll County, Illinois	14793	50052	27325
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1218	17	029	Coles County, Illinois	52802	38800	23944
1219	17	029	Coles County, Illinois	52802	38800	23944
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1227	17	029	Coles County, Illinois	52802	38800	23944
1228	17	033	Crawford County, Illinois	19441	47364	26245
1229	17	033	Crawford County, Illinois	19441	47364	26245
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1244	17	083	Jersey County, Illinois	22441	52738	26346
1245	17	083	Jersey County, Illinois	22441	52738	26346
1246	17	083	Jersey County, Illinois	22441	52738	26346
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1269	17	155	Putnam County, Illinois	5746	64085	32584
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1282	17	039	De Witt County, Illinois	16322	53510	28294
1283	17	039	De Witt County, Illinois	16322	53510	28294
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1291	17	051	Fayette County, Illinois	22025	44745	21665
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1321	17	107	Logan County, Illinois	29820	52676	23410
1322	17	107	Logan County, Illinois	29820	52676	23410
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1337	17	117	Macoupin County, Illinois	46482	52337	26779
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1347	17	159	Richland County, Illinois	16072	45597	23972
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1367	17	189	Washington County, Illinois	14369	54936	29548
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1371	17	189	Washington County, Illinois	14369	54936	29548
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1391	17	135	Montgomery County, Illinois	29301	45173	21072
1392	17	135	Montgomery County, Illinois	29301	45173	21072
1393	17	135	Montgomery County, Illinois	29301	45173	21072

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1396	17	135	Montgomery County, Illinois	29301	45173	21072
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1402	17	135	Montgomery County, Illinois	29301	45173	21072
1403	17	135	Montgomery County, Illinois	29301	45173	21072
1404	17	001	Adams County, Illinois	66949	48065	26053
1405	17	001	Adams County, Illinois	66949	48065	26053
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1418	17	001	Adams County, Illinois	66949	48065	26053
1419	17	001	Adams County, Illinois	66949	48065	26053
1420	17	027	Clinton County, Illinois	37858	63929	29512
1421	17	027	Clinton County, Illinois	37858	63929	29512
1422	17	027	Clinton County, Illinois	37858	63929	29512
1423	17	027	Clinton County, Illinois	37858	63929	29512
1424	17	027	Clinton County, Illinois	37858	63929	29512
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1432	17	027	Clinton County, Illinois	37858	63929	29512
1433	17	027	Clinton County, Illinois	37858	63929	29512
1434	17	027	Clinton County, Illinois	37858	63929	29512
1435	17	027	Clinton County, Illinois	37858	63929	29512
1436	17	027	Clinton County, Illinois	37858	63929	29512

1437	17	027	Clinton County, Illinois	37858	63929	29512
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1441	17	027	Clinton County, Illinois	37858	63929	29512
1442	17	027	Clinton County, Illinois	37858	63929	29512
1443	17	047	Edwards County, Illinois	6612	47035	25235
1444	17	047	Edwards County, Illinois	6612	47035	25235
1445	17	047	Edwards County, Illinois	6612	47035	25235
1446	17	047	Edwards County, Illinois	6612	47035	25235
1447	17	047	Edwards County, Illinois	6612	47035	25235
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1457	17	047	Edwards County, Illinois	6612	47035	25235
1458	17	047	Edwards County, Illinois	6612	47035	25235
1459	17	081	Jefferson County, Illinois	38523	43467	23054
1460	17	081	Jefferson County, Illinois	38523	43467	23054
1461	17	081	Jefferson County, Illinois	38523	43467	23054
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1465	17	081	Jefferson County, Illinois	38523	43467	23054
1466	17	081	Jefferson County, Illinois	38523	43467	23054
1467	17	183	Vermilion County, Illinois	79613	43552	22733
1468	17	183	Vermilion County, Illinois	79613	43552	22733
1469	17	183	Vermilion County, Illinois	79613	43552	22733
1470	17	183	Vermilion County, Illinois	79613	43552	22733
1471	17	183	Vermilion County, Illinois	79613	43552	22733
1472	17	183	Vermilion County, Illinois	79613	43552	22733
1473	17	183	Vermilion County, Illinois	79613	43552	22733
1474	17	183	Vermilion County, Illinois	79613	43552	22733
1475	17	183	Vermilion County, Illinois	79613	43552	22733
1476	17	183	Vermilion County, Illinois	79613	43552	22733
1477	17	183	Vermilion County, Illinois	79613	43552	22733
1478	17	183	Vermilion County, Illinois	79613	43552	22733
1479	17	199	Williamson County, Illinois	67336	45902	25238

1480	17	199	Williamson County, Illinois	67336	45902	25238
1481	17	199	Williamson County, Illinois	67336	45902	25238
1482	17	199	Williamson County, Illinois	67336	45902	25238
1483	17	199	Williamson County, Illinois	67336	45902	25238
1484	17	199	Williamson County, Illinois	67336	45902	25238
1485	17	023	Clark County, Illinois	16089	48693	25806
1486	17	023	Clark County, Illinois	16089	48693	25806
1487	17	023	Clark County, Illinois	16089	48693	25806
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1500	17	023	Clark County, Illinois	16089	48693	25806
1501	17	023	Clark County, Illinois	16089	48693	25806
1502	17	023	Clark County, Illinois	16089	48693	25806
1503	17	023	Clark County, Illinois	16089	48693	25806
1504	17	023	Clark County, Illinois	16089	48693	25806
1505	17	049	Effingham County, Illinois	34356	52977	27680
1506	17	049	Effingham County, Illinois	34356	52977	27680
1507	17	049	Effingham County, Illinois	34356	52977	27680
1508	17	049	Effingham County, Illinois	34356	52977	27680
1509	17	049	Effingham County, Illinois	34356	52977	27680
1510	17	049	Effingham County, Illinois	34356	52977	27680
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1512	17	049	Effingham County, Illinois	34356	52977	27680
1513	17	057	Fulton County, Illinois	36047	46183	22969
1514	17	057	Fulton County, Illinois	36047	46183	22969
1515	17	057	Fulton County, Illinois	36047	46183	22969
1516	17	057	Fulton County, Illinois	36047	46183	22969
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1531	17	057	Fulton County, Illinois	36047	46183	22969
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1533	17	065	Hamilton County, Illinois	8251	45076	24309
1534	17	065	Hamilton County, Illinois	8251	45076	24309
1535	17	065	Hamilton County, Illinois	8251	45076	24309
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1537	17	065	Hamilton County, Illinois	8251	45076	24309
1538	17	065	Hamilton County, Illinois	8251	45076	24309
1539	17	073	Henry County, Illinois	49681	54757	27777
1540	17	073	Henry County, Illinois	49681	54757	27777
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1557	17	087	Johnson County, Illinois	12866	44179	20928
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1572	17	097	Lake County, Illinois	702890	79886	40655
1573	17	097	Lake County, Illinois	702890	79886	40655
1574	17	097	Lake County, Illinois	702890	79886	40655
1575	17	097	Lake County, Illinois	702890	79886	40655
1576	17	097	Lake County, Illinois	702890	79886	40655
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1582	17	097	Lake County, Illinois	702890	79886	40655
1583	17	097	Lake County, Illinois	702890	79886	40655
1584	17	105	Livingston County, Illinois	37278	54074	26777
1585	17	105	Livingston County, Illinois	37278	54074	26777
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1597	17	171	Scott County, Illinois	5169	46210	25568
1598	17	171	Scott County, Illinois	5169	46210	25568
1599	17	171	Scott County, Illinois	5169	46210	25568
1600	17	171	Scott County, Illinois	5169	46210	25568
1601	17	171	Scott County, Illinois	5169	46210	25568
1602	17	171	Scott County, Illinois	5169	46210	25568
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1605	17	171	Scott County, Illinois	5169	46210	25568
1606	17	171	Scott County, Illinois	5169	46210	25568
1607	17	171	Scott County, Illinois	5169	46210	25568
1608	17	171	Scott County, Illinois	5169	46210	25568

1609	17	171	Scott County, Illinois	5169	46210	25568
1610	17	171	Scott County, Illinois	5169	46210	25568
1611	17	171	Scott County, Illinois	5169	46210	25568
1612	17	017	Cass County, Illinois	13068	48887	25010
1613	17	017	Cass County, Illinois	13068	48887	25010
1614	17	017	Cass County, Illinois	13068	48887	25010
1615	17	017	Cass County, Illinois	13068	48887	25010
1616	17	017	Cass County, Illinois	13068	48887	25010
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1639	17	017	Cass County, Illinois	13068	48887	25010
1640	17	017	Cass County, Illinois	13068	48887	25010
1641	17	187	Warren County, Illinois	17611	44067	23350
1642	17	187	Warren County, Illinois	17611	44067	23350
1643	17	187	Warren County, Illinois	17611	44067	23350
1644	17	187	Warren County, Illinois	17611	44067	23350
1645	17	187	Warren County, Illinois	17611	44067	23350
1646	17	187	Warren County, Illinois	17611	44067	23350

	county_name	long	lat	group	order	region	cluster
1	hancock	-91.18623	40.63417	34	573	illinois	1
2	hancock	-90.89976	40.63417	34	574	illinois	1
3	hancock	-90.91121	40.27893	34	575	illinois	1
4	hancock	-90.91121	40.19299	34	576	illinois	1

5	hancock	-91.49563	40.21018	34	577 illinois	1
6	hancock	-91.48990	40.25029	34	578 illinois	1
7	hancock	-91.46698	40.27893	34	579 illinois	1
8	hancock	-91.43834	40.34769	34	580 illinois	1
9	hancock	-91.41541	40.37634	34	581 illinois	1
10	hancock	-91.40968	40.38206	34	582 illinois	1
11	hancock	-91.38677	40.39352	34	583 illinois	1
12	hancock	-91.39250	40.42217	34	584 illinois	1
13	hancock	-91.39250	40.44509	34	585 illinois	1
14	hancock	-91.37531	40.49665	34	586 illinois	1
15	hancock	-91.41541	40.55395	34	587 illinois	1
16	hancock	-91.41541	40.56541	34	588 illinois	1
17	hancock	-91.37531	40.58833	34	589 illinois	1
18	hancock	-91.35239	40.61125	34	590 illinois	1
19	hancock	-91.30656	40.62271	34	591 illinois	1
20	hancock	-91.26645	40.62271	34	592 illinois	1
21	hancock	-91.18623	40.63417	34	593 illinois	1
22	grundy	-88.24696	41.10972	32	559 illinois	2
23	grundy	-88.59074	41.10399	32	560 illinois	2
24	grundy	-88.59647	41.47068	32	561 illinois	2
25	grundy	-88.26415	41.46495	32	562 illinois	2
26	grundy	-88.24696	41.20139	32	563 illinois	2
27	grundy	-88.24696	41.10972	32	564 illinois	2
28	kankakee	-88.24696	41.00086	46	764 illinois	3
29	kankakee	-88.24696	41.10972	46	765 illinois	3
30	kankakee	-88.24696	41.20139	46	766 illinois	3
31	kankakee	-88.02351	41.20139	46	767 illinois	3
32	kankakee	-88.02351	41.28734	46	768 illinois	3
33	kankakee	-87.52503	41.29307	46	769 illinois	3
34	kankakee	-87.52503	41.16702	46	770 illinois	3
35	kankakee	-87.53076	41.01805	46	771 illinois	3
36	kankakee	-88.13810	41.00086	46	772 illinois	3
37	kankakee	-88.24696	41.00086	46	773 illinois	3
39	alexander	-89.21526	37.34539	2	18 illinois	1
40	alexander	-89.20380	37.32247	2	19 illinois	1
41	alexander	-89.19807	37.31101	2	20 illinois	1
42	alexander	-89.20953	37.29955	2	21 illinois	1
43	alexander	-89.24964	37.27090	2	22 illinois	1
44	alexander	-89.25537	37.23653	2	23 illinois	1
45	alexander	-89.26682	37.21934	2	24 illinois	1
46	alexander	-89.26682	37.20788	2	25 illinois	1
47	alexander	-89.26682	37.19642	2	26 illinois	1
48	alexander	-89.27255	37.17923	2	27 illinois	1

49	alexander	-89.26682	37.15631	2	28 illinois	1
50	alexander	-89.27255	37.13912	2	29 illinois	1
51	alexander	-89.26109	37.11048	2	30 illinois	1
52	alexander	-89.24964	37.09901	2	31 illinois	1
53	alexander	-89.20953	37.09901	2	32 illinois	1
54	alexander	-89.19807	37.09329	2	33 illinois	1
55	alexander	-89.18088	37.07037	2	34 illinois	1
56	alexander	-89.19234	37.04172	2	35 illinois	1
57	alexander	-89.17515	37.00161	2	36 illinois	1
58	alexander	-89.19807	37.03026	2	37 illinois	1
59	alexander	-89.24390	37.07037	2	38 illinois	1
60	alexander	-89.26682	37.09329	2	39 illinois	1
61	alexander	-89.28974	37.08756	2	40 illinois	1
62	alexander	-89.28401	37.05891	2	41 illinois	1
63	alexander	-89.26109	37.02453	2	42 illinois	1
64	alexander	-89.27828	37.00734	2	43 illinois	1
65	alexander	-89.30120	37.00734	2	44 illinois	1
66	alexander	-89.32985	37.01880	2	45 illinois	1
67	alexander	-89.35277	37.04172	2	46 illinois	1
68	alexander	-89.38715	37.08183	2	47 illinois	1
69	alexander	-89.39288	37.11621	2	48 illinois	1
70	alexander	-89.40434	37.14485	2	49 illinois	1
71	alexander	-89.44444	37.17923	2	50 illinois	1
72	alexander	-89.45590	37.21934	2	51 illinois	1
73	alexander	-89.46735	37.25945	2	52 illinois	1
74	alexander	-89.50174	37.27090	2	53 illinois	1
75	alexander	-89.51319	37.28809	2	54 illinois	1
76	alexander	-89.50746	37.31674	2	55 illinois	1
77	alexander	-89.47309	37.33393	2	56 illinois	1
78	alexander	-89.21526	37.34539	2	57 illinois	1
79	menard	-89.98875	40.12423	65	1053 illinois	1
80	menard	-89.97729	40.13569	65	1054 illinois	1
81	menard	-89.91427	40.13569	65	1055 illinois	1
82	menard	-89.86843	40.12996	65	1056 illinois	1
83	menard	-89.80540	40.12423	65	1057 illinois	1
84	menard	-89.78822	40.12423	65	1058 illinois	1
85	menard	-89.74812	40.12996	65	1059 illinois	1
86	menard	-89.72519	40.13569	65	1060 illinois	1
87	menard	-89.70228	40.14143	65	1061 illinois	1
88	menard	-89.67935	40.15288	65	1062 illinois	1
89	menard	-89.65644	40.15861	65	1063 illinois	1
90	menard	-89.63351	40.15288	65	1064 illinois	1
91	menard	-89.59914	40.12996	65	1065 illinois	1

92	menard	-89.60487	40.09559	65	1066	illinois	1
93	menard	-89.57623	40.09559	65	1067	illinois	1
94	menard	-89.57623	39.98100	65	1068	illinois	1
95	menard	-89.68508	39.97527	65	1069	illinois	1
96	menard	-89.68508	39.96381	65	1070	illinois	1
97	menard	-89.70228	39.96381	65	1071	illinois	1
98	menard	-89.69081	39.91797	65	1072	illinois	1
99	menard	-89.75384	39.91797	65	1073	illinois	1
100	menard	-89.75384	39.90078	65	1074	illinois	1
101	menard	-89.98875	39.90078	65	1075	illinois	1
102	menard	-89.98875	40.12423	65	1076	illinois	1
104	cook	-88.20686	42.15824	16	305	illinois	4
105	cook	-87.77141	42.15824	16	306	illinois	4
106	cook	-87.74275	42.12386	16	307	illinois	4
107	cook	-87.67400	42.06656	16	308	illinois	4
108	cook	-87.66254	42.04364	16	309	illinois	4
109	cook	-87.63963	41.99781	16	310	illinois	4
110	cook	-87.62817	41.94051	16	311	illinois	4
111	cook	-87.60525	41.85456	16	312	illinois	4
112	cook	-87.58233	41.78008	16	313	illinois	4
113	cook	-87.55368	41.75143	16	314	illinois	4
114	cook	-87.53076	41.73997	16	315	illinois	4
115	cook	-87.52503	41.46495	16	316	illinois	4
116	cook	-87.79432	41.46495	16	317	illinois	4
117	cook	-87.79432	41.55090	16	318	illinois	4
118	cook	-87.91464	41.56236	16	319	illinois	4
119	cook	-87.92037	41.64257	16	320	illinois	4
120	cook	-88.03497	41.64257	16	321	illinois	4
121	cook	-88.03497	41.66549	16	322	illinois	4
122	cook	-87.99486	41.66549	16	323	illinois	4
123	cook	-87.97767	41.66549	16	324	illinois	4
124	cook	-87.94902	41.71706	16	325	illinois	4
125	cook	-87.92610	41.72279	16	326	illinois	4
126	cook	-87.92610	41.99208	16	327	illinois	4
127	cook	-88.27560	41.98635	16	328	illinois	4
128	cook	-88.26987	42.06656	16	329	illinois	4
129	cook	-88.24696	42.08375	16	330	illinois	4
130	cook	-88.24696	42.15824	16	331	illinois	4
131	cook	-88.20686	42.15824	16	332	illinois	4
132	macon	-89.14077	40.04975	58	918	illinois	3
133	macon	-88.73970	40.05548	58	919	illinois	3
134	macon	-88.75117	39.79192	58	920	illinois	3
135	macon	-88.76263	39.79192	58	921	illinois	3

136	macon	-88.76263	39.73462	58	922	illinois	3
137	macon	-88.81419	39.73462	58	923	illinois	3
138	macon	-88.81419	39.64295	58	924	illinois	3
139	macon	-89.02618	39.65441	58	925	illinois	3
140	macon	-89.14077	39.65441	58	926	illinois	3
141	macon	-89.14077	39.78046	58	927	illinois	3
142	macon	-89.14650	39.79192	58	928	illinois	3
143	macon	-89.18088	39.79765	58	929	illinois	3
144	macon	-89.22099	39.82630	58	930	illinois	3
145	macon	-89.22099	39.91797	58	931	illinois	3
146	macon	-89.14650	39.91797	58	932	illinois	3
147	macon	-89.14077	40.04975	58	933	illinois	3
148	morgan	-89.99448	39.86641	69	1132	illinois	2
149	morgan	-89.99448	39.78619	69	1133	illinois	2
150	morgan	-89.98302	39.78619	69	1134	illinois	2
151	morgan	-89.98302	39.71170	69	1135	illinois	2
152	morgan	-89.91427	39.56274	69	1136	illinois	2
153	morgan	-89.91999	39.52263	69	1137	illinois	2
154	morgan	-90.14918	39.52263	69	1138	illinois	2
155	morgan	-90.30388	39.52263	69	1139	illinois	2
156	morgan	-90.29815	39.63149	69	1140	illinois	2
157	morgan	-90.33253	39.63149	69	1141	illinois	2
158	morgan	-90.33253	39.66014	69	1142	illinois	2
159	morgan	-90.37263	39.66587	69	1143	illinois	2
160	morgan	-90.37263	39.74608	69	1144	illinois	2
161	morgan	-90.48723	39.75181	69	1145	illinois	2
162	morgan	-90.48723	39.78619	69	1146	illinois	2
163	morgan	-90.60755	39.78619	69	1147	illinois	2
164	morgan	-90.58463	39.83203	69	1148	illinois	2
165	morgan	-90.58463	39.86641	69	1149	illinois	2
166	morgan	-89.99448	39.86641	69	1150	illinois	2
167	wayne	-88.16102	38.56579	96	1695	illinois	1
168	wayne	-88.15528	38.25066	96	1696	illinois	1
169	wayne	-88.38447	38.25066	96	1697	illinois	1
170	wayne	-88.70533	38.25066	96	1698	illinois	1
171	wayne	-88.70533	38.46839	96	1699	illinois	1
172	wayne	-88.70533	38.59444	96	1700	illinois	1
173	wayne	-88.25269	38.59444	96	1701	illinois	1
174	wayne	-88.16102	38.59444	96	1702	illinois	1
175	wayne	-88.16102	38.56579	96	1703	illinois	1
176	woodford	-89.04337	40.92637	102	1777	illinois	2
177	woodford	-88.92878	40.92637	102	1778	illinois	2
178	woodford	-88.93451	40.74876	102	1779	illinois	2

179	woodford	-88.98035	40.74876	102	1780	illinois	2
180	woodford	-88.98608	40.65709	102	1781	illinois	2
181	woodford	-89.03764	40.66282	102	1782	illinois	2
182	woodford	-89.03764	40.62271	102	1783	illinois	2
183	woodford	-89.10066	40.62271	102	1784	illinois	2
184	woodford	-89.10066	40.60552	102	1785	illinois	2
185	woodford	-89.13504	40.61125	102	1786	illinois	2
186	woodford	-89.14077	40.58833	102	1787	illinois	2
187	woodford	-89.26682	40.58833	102	1788	illinois	2
188	woodford	-89.26682	40.60552	102	1789	illinois	2
189	woodford	-89.32412	40.60552	102	1790	illinois	2
190	woodford	-89.32985	40.74876	102	1791	illinois	2
191	woodford	-89.55330	40.75449	102	1792	illinois	2
192	woodford	-89.55330	40.77741	102	1793	illinois	2
193	woodford	-89.55330	40.81178	102	1794	illinois	2
194	woodford	-89.52466	40.83470	102	1795	illinois	2
195	woodford	-89.50746	40.88054	102	1796	illinois	2
196	woodford	-89.45590	40.92637	102	1797	illinois	2
197	woodford	-89.04337	40.92637	102	1798	illinois	2
198	franklin	-88.70533	37.90689	28	475	illinois	2
199	franklin	-88.71106	37.86678	28	476	illinois	2
200	franklin	-89.15223	37.86105	28	477	illinois	2
201	franklin	-89.15223	37.95845	28	478	illinois	2
202	franklin	-89.17515	37.95845	28	479	illinois	2
203	franklin	-89.15223	37.99856	28	480	illinois	2
204	franklin	-89.14077	38.02148	28	481	illinois	2
205	franklin	-89.14077	38.03867	28	482	illinois	2
206	franklin	-89.13504	38.06159	28	483	illinois	2
207	franklin	-89.12359	38.07304	28	484	illinois	2
208	franklin	-89.11213	38.08450	28	485	illinois	2
209	franklin	-89.12359	38.08450	28	486	illinois	2
210	franklin	-89.13504	38.10742	28	487	illinois	2
211	franklin	-89.12932	38.11888	28	488	illinois	2
212	franklin	-88.71106	38.11888	28	489	illinois	2
213	franklin	-88.70533	37.90689	28	490	illinois	2
214	mcdonough	-90.79662	40.62271	55	879	illinois	2
215	mcdonough	-90.44712	40.62271	55	880	illinois	2
216	mcdonough	-90.45284	40.27320	55	881	illinois	2
217	mcdonough	-90.91121	40.27893	55	882	illinois	2
218	mcdonough	-90.89976	40.63417	55	883	illinois	2
219	mcdonough	-90.79662	40.62271	55	884	illinois	2
220	mchenry	-88.20112	42.50774	56	886	illinois	5
221	mchenry	-88.20686	42.15824	56	887	illinois	5

222	mchenry	-88.24696	42.15824	56	888	illinois	5
223	mchenry	-88.57928	42.15824	56	889	illinois	5
224	mchenry	-88.70533	42.15824	56	890	illinois	5
225	mchenry	-88.69959	42.50201	56	891	illinois	5
226	mchenry	-88.30426	42.50201	56	892	illinois	5
227	mchenry	-88.20112	42.50774	56	893	illinois	5
228	moultrie	-88.47614	39.64295	70	1152	illinois	1
229	moultrie	-88.47614	39.44241	70	1153	illinois	1
230	moultrie	-88.59074	39.44241	70	1154	illinois	1
231	moultrie	-88.59074	39.47106	70	1155	illinois	1
232	moultrie	-88.61366	39.47106	70	1156	illinois	1
233	moultrie	-88.61366	39.49398	70	1157	illinois	1
234	moultrie	-88.63084	39.49398	70	1158	illinois	1
235	moultrie	-88.63084	39.50544	70	1159	illinois	1
236	moultrie	-88.64230	39.50544	70	1160	illinois	1
237	moultrie	-88.64230	39.51690	70	1161	illinois	1
238	moultrie	-88.72251	39.51690	70	1162	illinois	1
239	moultrie	-88.72251	39.56846	70	1163	illinois	1
240	moultrie	-88.81419	39.56846	70	1164	illinois	1
241	moultrie	-88.81419	39.64295	70	1165	illinois	1
242	moultrie	-88.81419	39.73462	70	1166	illinois	1
243	moultrie	-88.76263	39.73462	70	1167	illinois	1
244	moultrie	-88.76263	39.79192	70	1168	illinois	1
245	moultrie	-88.75117	39.79192	70	1169	illinois	1
246	moultrie	-88.47614	39.79192	70	1170	illinois	1
247	moultrie	-88.47614	39.64295	70	1171	illinois	1
248	perry	-89.14650	38.21056	73	1219	illinois	1
249	perry	-89.14650	38.12461	73	1220	illinois	1
250	perry	-89.12932	38.11888	73	1221	illinois	1
251	perry	-89.13504	38.10742	73	1222	illinois	1
252	perry	-89.12359	38.08450	73	1223	illinois	1
253	perry	-89.11213	38.08450	73	1224	illinois	1
254	perry	-89.12359	38.07304	73	1225	illinois	1
255	perry	-89.13504	38.06159	73	1226	illinois	1
256	perry	-89.14077	38.03867	73	1227	illinois	1
257	perry	-89.14077	38.02148	73	1228	illinois	1
258	perry	-89.15223	37.99856	73	1229	illinois	1
259	perry	-89.17515	37.95845	73	1230	illinois	1
260	perry	-89.58768	37.95272	73	1231	illinois	1
261	perry	-89.58768	38.21629	73	1232	illinois	1
262	perry	-89.46735	38.22202	73	1233	illinois	1
263	perry	-89.42725	38.21629	73	1234	illinois	1
264	perry	-89.14650	38.21056	73	1235	illinois	1

265	pope	-88.71106	37.34539	76	1277	illinois	1
266	pope	-88.71106	37.60322	76	1278	illinois	1
267	pope	-88.40166	37.60322	76	1279	illinois	1
268	pope	-88.40166	37.43133	76	1280	illinois	1
269	pope	-88.44749	37.42560	76	1281	illinois	1
270	pope	-88.47041	37.40841	76	1282	illinois	1
271	pope	-88.48187	37.38549	76	1283	illinois	1
272	pope	-88.48760	37.33393	76	1284	illinois	1
273	pope	-88.51052	37.30528	76	1285	illinois	1
274	pope	-88.51624	37.27663	76	1286	illinois	1
275	pope	-88.50479	37.25372	76	1287	illinois	1
276	pope	-88.45322	37.20215	76	1288	illinois	1
277	pope	-88.44749	37.16777	76	1289	illinois	1
278	pope	-88.45322	37.13340	76	1290	illinois	1
279	pope	-88.47041	37.08756	76	1291	illinois	1
280	pope	-88.49906	37.08183	76	1292	illinois	1
281	pope	-88.49906	37.16777	76	1293	illinois	1
282	pope	-88.71106	37.34539	76	1294	illinois	1
284	shelby	-88.81419	39.64295	87	1540	illinois	1
285	shelby	-88.81419	39.56846	87	1541	illinois	1
286	shelby	-88.72251	39.56846	87	1542	illinois	1
287	shelby	-88.72251	39.51690	87	1543	illinois	1
288	shelby	-88.64230	39.51690	87	1544	illinois	1
289	shelby	-88.64230	39.50544	87	1545	illinois	1
290	shelby	-88.63084	39.50544	87	1546	illinois	1
291	shelby	-88.63084	39.49398	87	1547	illinois	1
292	shelby	-88.61366	39.49398	87	1548	illinois	1
293	shelby	-88.61366	39.47106	87	1549	illinois	1
294	shelby	-88.59074	39.47106	87	1550	illinois	1
295	shelby	-88.59074	39.44241	87	1551	illinois	1
296	shelby	-88.47614	39.44241	87	1552	illinois	1
297	shelby	-88.47614	39.37366	87	1553	illinois	1
298	shelby	-88.47614	39.21323	87	1554	illinois	1
299	shelby	-88.80273	39.21896	87	1555	illinois	1
300	shelby	-89.14077	39.21896	87	1556	illinois	1
301	shelby	-89.14077	39.35074	87	1557	illinois	1
302	shelby	-89.03191	39.35074	87	1558	illinois	1
303	shelby	-89.02618	39.65441	87	1559	illinois	1
304	shelby	-88.81419	39.64295	87	1560	illinois	1
305	champaign	-88.46468	40.27893	10	192	illinois	3
306	champaign	-88.45895	40.38780	10	193	illinois	3
307	champaign	-88.01205	40.39352	10	194	illinois	3
308	champaign	-88.00632	40.37634	10	195	illinois	3

309	champaign	-87.93183	40.37061	10	196	illinois	3
310	champaign	-87.93183	40.22164	10	197	illinois	3
311	champaign	-87.94329	40.22164	10	198	illinois	3
312	champaign	-87.94329	39.87214	10	199	illinois	3
313	champaign	-88.47041	39.87214	10	200	illinois	3
314	champaign	-88.47614	40.21018	10	201	illinois	3
315	champaign	-88.46468	40.21591	10	202	illinois	3
316	champaign	-88.46468	40.27893	10	203	illinois	3
317	calhoun	-90.93414	39.40231	7	114	illinois	1
318	calhoun	-90.63619	39.39658	7	115	illinois	1
319	calhoun	-90.63619	39.36220	7	116	illinois	1
320	calhoun	-90.63046	39.32209	7	117	illinois	1
321	calhoun	-90.62473	39.27626	7	118	illinois	1
322	calhoun	-90.60755	39.23042	7	119	illinois	1
323	calhoun	-90.60755	39.20750	7	120	illinois	1
324	calhoun	-90.61328	39.17313	7	121	illinois	1
325	calhoun	-90.60755	39.11583	7	122	illinois	1
326	calhoun	-90.60181	39.08145	7	123	illinois	1
327	calhoun	-90.57890	39.03561	7	124	illinois	1
328	calhoun	-90.57890	38.98978	7	125	illinois	1
329	calhoun	-90.56171	38.96113	7	126	illinois	1
330	calhoun	-90.52161	38.94967	7	127	illinois	1
331	calhoun	-90.49295	38.96686	7	128	illinois	1
332	calhoun	-90.45284	38.96113	7	129	illinois	1
333	calhoun	-90.49295	38.92675	7	130	illinois	1
334	calhoun	-90.54452	38.88664	7	131	illinois	1
335	calhoun	-90.56744	38.86946	7	132	illinois	1
336	calhoun	-90.60181	38.85800	7	133	illinois	1
337	calhoun	-90.63619	38.88092	7	134	illinois	1
338	calhoun	-90.67057	38.91529	7	135	illinois	1
339	calhoun	-90.67630	38.93821	7	136	illinois	1
340	calhoun	-90.69922	38.99551	7	137	illinois	1
341	calhoun	-90.71641	39.05280	7	138	illinois	1
342	calhoun	-90.69922	39.11010	7	139	illinois	1
343	calhoun	-90.72214	39.14448	7	140	illinois	1
344	calhoun	-90.72787	39.17885	7	141	illinois	1
345	calhoun	-90.72214	39.21896	7	142	illinois	1
346	calhoun	-90.74506	39.23615	7	143	illinois	1
347	calhoun	-90.76225	39.26480	7	144	illinois	1
348	calhoun	-90.81381	39.31063	7	145	illinois	1
349	calhoun	-90.89403	39.36793	7	146	illinois	1
350	calhoun	-90.93414	39.40231	7	147	illinois	1
351	ford	-88.24696	41.00086	27	459	illinois	1

352		ford	-88.13810	41.00086	27	460	illinois	1
353		ford	-88.13237	40.66282	27	461	illinois	1
354		ford	-88.12091	40.65709	27	462	illinois	1
355		ford	-88.11518	40.49093	27	463	illinois	1
356		ford	-88.00059	40.48520	27	464	illinois	1
357		ford	-87.99486	40.47947	27	465	illinois	1
358		ford	-87.92610	40.47947	27	466	illinois	1
359		ford	-87.93183	40.37061	27	467	illinois	1
360		ford	-88.00632	40.37634	27	468	illinois	1
361		ford	-88.01205	40.39352	27	469	illinois	1
362		ford	-88.45895	40.38780	27	470	illinois	1
363		ford	-88.46468	40.60552	27	471	illinois	1
364		ford	-88.24696	40.61125	27	472	illinois	1
365		ford	-88.24696	41.00086	27	473	illinois	1
366	jo	daviess	-89.91427	42.50201	43	722	illinois	1
367	jo	daviess	-89.91999	42.20407	43	723	illinois	1
368	jo	daviess	-90.32680	42.20407	43	724	illinois	1
369	jo	daviess	-90.37263	42.22699	43	725	illinois	1
370	jo	daviess	-90.40701	42.24991	43	726	illinois	1
371	jo	daviess	-90.41846	42.29575	43	727	illinois	1
372	jo	daviess	-90.41846	42.33585	43	728	illinois	1
373	jo	daviess	-90.45284	42.37023	43	729	illinois	1
374	jo	daviess	-90.48150	42.38742	43	730	illinois	1
375	jo	daviess	-90.64192	42.47336	43	731	illinois	1
376	jo	daviess	-90.64765	42.50774	43	732	illinois	1
377	jo	daviess	-90.64192	42.50774	43	733	illinois	1
378	jo	daviess	-90.41846	42.50774	43	734	illinois	1
379	jo	daviess	-89.91427	42.50201	43	735	illinois	1
380		kendall	-88.27560	41.72279	47	775	illinois	3
381		kendall	-88.26415	41.46495	47	776	illinois	3
382		kendall	-88.59647	41.47068	47	777	illinois	3
383		kendall	-88.59647	41.63111	47	778	illinois	3
384		kendall	-88.59074	41.72279	47	779	illinois	3
385		kendall	-88.27560	41.72279	47	780	illinois	3
386		lawrence	-87.54795	38.85227	51	817	illinois	1
387		lawrence	-87.51930	38.80070	51	818	illinois	1
388		lawrence	-87.49638	38.73768	51	819	illinois	1
389		lawrence	-87.51930	38.70330	51	820	illinois	1
390		lawrence	-87.54795	38.68611	51	821	illinois	1
391		lawrence	-87.59379	38.66892	51	822	illinois	1
392		lawrence	-87.62817	38.63454	51	823	illinois	1
393		lawrence	-87.63390	38.59444	51	824	illinois	1
394		lawrence	-87.66254	38.56579	51	825	illinois	1

395	lawrence	-87.91464	38.56579	51	826	illinois	1
396	lawrence	-87.91464	38.85227	51	827	illinois	1
397	lawrence	-87.54795	38.85227	51	828	illinois	1
398	marion	-89.14650	38.49703	61	968	illinois	2
399	marion	-89.14650	38.73195	61	969	illinois	2
400	marion	-89.14077	38.82935	61	970	illinois	2
401	marion	-88.69959	38.82935	61	971	illinois	2
402	marion	-88.70533	38.59444	61	972	illinois	2
403	marion	-88.70533	38.46839	61	973	illinois	2
404	marion	-89.14650	38.46839	61	974	illinois	2
405	marion	-89.14650	38.49703	61	975	illinois	2
406	mason	-90.36118	40.11851	63	989	illinois	1
407	mason	-90.33826	40.13569	63	990	illinois	1
408	mason	-90.32107	40.13569	63	991	illinois	1
409	mason	-90.29815	40.14715	63	992	illinois	1
410	mason	-90.25804	40.14715	63	993	illinois	1
411	mason	-90.22366	40.14715	63	994	illinois	1
412	mason	-90.20647	40.15861	63	995	illinois	1
413	mason	-90.20075	40.18726	63	996	illinois	1
414	mason	-90.18356	40.20445	63	997	illinois	1
415	mason	-90.13199	40.22164	63	998	illinois	1
416	mason	-90.10334	40.26747	63	999	illinois	1
417	mason	-90.08042	40.27893	63	1000	illinois	1
418	mason	-90.05177	40.34769	63	1001	illinois	1
419	mason	-90.02313	40.37634	63	1002	illinois	1
420	mason	-89.96583	40.41071	63	1003	illinois	1
421	mason	-89.91427	40.42790	63	1004	illinois	1
422	mason	-89.72519	40.43363	63	1005	illinois	1
423	mason	-89.71946	40.31904	63	1006	illinois	1
424	mason	-89.58768	40.31904	63	1007	illinois	1
425	mason	-89.59914	40.12996	63	1008	illinois	1
426	mason	-89.63351	40.15288	63	1009	illinois	1
427	mason	-89.65644	40.15861	63	1010	illinois	1
428	mason	-89.67935	40.15288	63	1011	illinois	1
429	mason	-89.70228	40.14143	63	1012	illinois	1
430	mason	-89.72519	40.13569	63	1013	illinois	1
431	mason	-89.74812	40.12996	63	1014	illinois	1
432	mason	-89.78822	40.12423	63	1015	illinois	1
433	mason	-89.80540	40.12423	63	1016	illinois	1
434	mason	-89.86843	40.12996	63	1017	illinois	1
435	mason	-89.91427	40.13569	63	1018	illinois	1
436	mason	-89.97729	40.13569	63	1019	illinois	1
437	mason	-89.98875	40.12423	63	1020	illinois	1

438	mason	-90.02313	40.10131	63	1021	illinois	1
439	mason	-90.03459	40.10131	63	1022	illinois	1
440	mason	-90.07470	40.08986	63	1023	illinois	1
441	mason	-90.10908	40.07840	63	1024	illinois	1
442	mason	-90.13199	40.07267	63	1025	illinois	1
443	mason	-90.17210	40.06121	63	1026	illinois	1
444	mason	-90.19501	40.06694	63	1027	illinois	1
445	mason	-90.22366	40.04975	63	1028	illinois	1
446	mason	-90.26377	40.06121	63	1029	illinois	1
447	mason	-90.28669	40.04975	63	1030	illinois	1
448	mason	-90.29815	40.06121	63	1031	illinois	1
449	mason	-90.30388	40.08413	63	1032	illinois	1
450	mason	-90.32680	40.10704	63	1033	illinois	1
451	mason	-90.36118	40.11851	63	1034	illinois	1
452	iroquois	-87.52503	40.73157	38	644	illinois	2
453	iroquois	-87.53076	40.47947	38	645	illinois	2
454	iroquois	-87.92610	40.47947	38	646	illinois	2
455	iroquois	-87.99486	40.47947	38	647	illinois	2
456	iroquois	-88.00059	40.48520	38	648	illinois	2
457	iroquois	-88.11518	40.49093	38	649	illinois	2
458	iroquois	-88.12091	40.65709	38	650	illinois	2
459	iroquois	-88.13237	40.66282	38	651	illinois	2
460	iroquois	-88.13810	41.00086	38	652	illinois	2
461	iroquois	-87.53076	41.01805	38	653	illinois	2
462	iroquois	-87.52503	40.73157	38	654	illinois	2
463	clay	-88.25269	38.59444	13	250	illinois	1
464	clay	-88.70533	38.59444	13	251	illinois	1
465	clay	-88.69959	38.82935	13	252	illinois	1
466	clay	-88.69959	38.90956	13	253	illinois	1
467	clay	-88.36728	38.91529	13	254	illinois	1
468	clay	-88.36728	38.85800	13	255	illinois	1
469	clay	-88.26987	38.85227	13	256	illinois	1
470	clay	-88.26987	38.72049	13	257	illinois	1
471	clay	-88.28706	38.72049	13	258	illinois	1
472	clay	-88.28706	38.70330	13	259	illinois	1
473	clay	-88.28133	38.68038	13	260	illinois	1
474	clay	-88.28133	38.66892	13	261	illinois	1
475	clay	-88.29853	38.64600	13	262	illinois	1
476	clay	-88.29853	38.62881	13	263	illinois	1
477	clay	-88.29853	38.61736	13	264	illinois	1
478	clay	-88.28133	38.61736	13	265	illinois	1
479	clay	-88.27560	38.61163	13	266	illinois	1
480	clay	-88.25842	38.60590	13	267	illinois	1

481	clay	-88.25269	38.59444	13	268	illinois	1
482	gallatin	-88.37874	37.90689	30	513	illinois	1
483	gallatin	-88.13237	37.90689	30	514	illinois	1
484	gallatin	-88.10372	37.90116	30	515	illinois	1
485	gallatin	-88.09226	37.88397	30	516	illinois	1
486	gallatin	-88.05215	37.86105	30	517	illinois	1
487	gallatin	-88.08080	37.83241	30	518	illinois	1
488	gallatin	-88.04642	37.82094	30	519	illinois	1
489	gallatin	-88.02351	37.79230	30	520	illinois	1
490	gallatin	-88.04642	37.76365	30	521	illinois	1
491	gallatin	-88.09799	37.72927	30	522	illinois	1
492	gallatin	-88.14383	37.70062	30	523	illinois	1
493	gallatin	-88.16102	37.67198	30	524	illinois	1
494	gallatin	-88.16102	37.63187	30	525	illinois	1
495	gallatin	-88.12664	37.58603	30	526	illinois	1
496	gallatin	-88.18966	37.60322	30	527	illinois	1
497	gallatin	-88.37874	37.60322	30	528	illinois	1
498	gallatin	-88.37874	37.90689	30	529	illinois	1
499	monroe	-90.26377	38.50276	67	1094	illinois	2
500	monroe	-90.14918	38.42828	67	1095	illinois	2
501	monroe	-90.16064	38.40536	67	1096	illinois	2
502	monroe	-90.14918	38.39963	67	1097	illinois	2
503	monroe	-90.09761	38.35952	67	1098	illinois	2
504	monroe	-90.08042	38.34807	67	1099	illinois	2
505	monroe	-90.05177	38.30223	67	1100	illinois	2
506	monroe	-89.91427	38.30223	67	1101	illinois	2
507	monroe	-89.90854	38.27931	67	1102	illinois	2
508	monroe	-89.91999	38.27358	67	1103	illinois	2
509	monroe	-89.90281	38.22202	67	1104	illinois	2
510	monroe	-90.03459	38.22202	67	1105	illinois	2
511	monroe	-90.03459	38.13607	67	1106	illinois	2
512	monroe	-90.20647	38.08450	67	1107	illinois	2
513	monroe	-90.25231	38.11888	67	1108	illinois	2
514	monroe	-90.30388	38.17045	67	1109	illinois	2
515	monroe	-90.37263	38.21629	67	1110	illinois	2
516	monroe	-90.37836	38.24493	67	1111	illinois	2
517	monroe	-90.39555	38.33088	67	1112	illinois	2
518	monroe	-90.36691	38.38244	67	1113	illinois	2
519	monroe	-90.34399	38.40536	67	1114	illinois	2
520	monroe	-90.30388	38.42828	67	1115	illinois	2
521	monroe	-90.26377	38.50276	67	1116	illinois	2
522	peoria	-89.63924	40.97221	72	1193	illinois	3
523	peoria	-89.44444	40.97221	72	1194	illinois	3

524	peoria	-89.45590	40.92637	72	1195	illinois	3
525	peoria	-89.50746	40.88054	72	1196	illinois	3
526	peoria	-89.52466	40.83470	72	1197	illinois	3
527	peoria	-89.55330	40.81178	72	1198	illinois	3
528	peoria	-89.55330	40.77741	72	1199	illinois	3
529	peoria	-89.55330	40.75449	72	1200	illinois	3
530	peoria	-89.55330	40.73157	72	1201	illinois	3
531	peoria	-89.55903	40.70865	72	1202	illinois	3
532	peoria	-89.62206	40.65709	72	1203	illinois	3
533	peoria	-89.63351	40.63417	72	1204	illinois	3
534	peoria	-89.65644	40.60552	72	1205	illinois	3
535	peoria	-89.66217	40.57687	72	1206	illinois	3
536	peoria	-89.68508	40.54823	72	1207	illinois	3
537	peoria	-89.72519	40.55395	72	1208	illinois	3
538	peoria	-89.73665	40.54823	72	1209	illinois	3
539	peoria	-89.78249	40.54249	72	1210	illinois	3
540	peoria	-89.82259	40.53104	72	1211	illinois	3
541	peoria	-89.86843	40.50812	72	1212	illinois	3
542	peoria	-89.86843	40.61698	72	1213	illinois	3
543	peoria	-89.99448	40.61698	72	1214	illinois	3
544	peoria	-89.98875	40.71438	72	1215	illinois	3
545	peoria	-89.98875	40.97221	72	1216	illinois	3
546	peoria	-89.63924	40.97221	72	1217	illinois	3
547	madison	-90.26950	38.92675	60	946	illinois	5
548	madison	-90.28096	39.00124	60	947	illinois	5
549	madison	-90.14918	39.00697	60	948	illinois	5
550	madison	-89.70228	39.00697	60	949	illinois	5
551	madison	-89.63924	39.00124	60	950	illinois	5
552	madison	-89.63924	38.87519	60	951	illinois	5
553	madison	-89.59914	38.87519	60	952	illinois	5
554	madison	-89.59341	38.73768	60	953	illinois	5
555	madison	-89.59914	38.65173	60	954	illinois	5
556	madison	-89.70801	38.65173	60	955	illinois	5
557	madison	-90.18356	38.65173	60	956	illinois	5
558	madison	-90.19501	38.68611	60	957	illinois	5
559	madison	-90.18929	38.73768	60	958	illinois	5
560	madison	-90.17783	38.77205	60	959	illinois	5
561	madison	-90.14345	38.77778	60	960	illinois	5
562	madison	-90.12054	38.80070	60	961	illinois	5
563	madison	-90.12054	38.82935	60	962	illinois	5
564	madison	-90.14345	38.85800	60	963	illinois	5
565	madison	-90.18929	38.88664	60	964	illinois	5
566	madison	-90.24085	38.92102	60	965	illinois	5

567	madison	-90.26950	38.92675	60	966	illinois	5
568	merc	-90.43566	41.32745	66	1078	illinois	1
569	merc	-90.44139	41.14410	66	1079	illinois	1
570	merc	-90.44139	41.06388	66	1080	illinois	1
571	merc	-90.79662	41.06388	66	1081	illinois	1
572	merc	-90.94559	41.06961	66	1082	illinois	1
573	merc	-90.95132	41.08107	66	1083	illinois	1
574	merc	-90.95705	41.11545	66	1084	illinois	1
575	merc	-90.98570	41.15556	66	1085	illinois	1
576	merc	-91.02008	41.17847	66	1086	illinois	1
577	merc	-91.05445	41.20139	66	1087	illinois	1
578	merc	-91.08883	41.23005	66	1088	illinois	1
579	merc	-91.08883	41.27015	66	1089	illinois	1
580	merc	-91.06592	41.31026	66	1090	illinois	1
581	merc	-91.06018	41.32745	66	1091	illinois	1
582	merc	-90.43566	41.32745	66	1092	illinois	1
583	sangamon	-89.22099	39.82630	84	1459	illinois	3
584	sangamon	-89.23817	39.82630	84	1460	illinois	3
585	sangamon	-89.25537	39.81483	84	1461	illinois	3
586	sangamon	-89.27828	39.80911	84	1462	illinois	3
587	sangamon	-89.27828	39.79765	84	1463	illinois	3
588	sangamon	-89.31266	39.76900	84	1464	illinois	3
589	sangamon	-89.35850	39.75754	84	1465	illinois	3
590	sangamon	-89.38715	39.74608	84	1466	illinois	3
591	sangamon	-89.42152	39.75754	84	1467	illinois	3
592	sangamon	-89.42725	39.68306	84	1468	illinois	3
593	sangamon	-89.47882	39.68306	84	1469	illinois	3
594	sangamon	-89.47882	39.63722	84	1470	illinois	3
595	sangamon	-89.54185	39.63722	84	1471	illinois	3
596	sangamon	-89.54185	39.52263	84	1472	illinois	3
597	sangamon	-89.69081	39.52263	84	1473	illinois	3
598	sangamon	-89.91999	39.52263	84	1474	illinois	3
599	sangamon	-89.91427	39.56274	84	1475	illinois	3
600	sangamon	-89.98302	39.71170	84	1476	illinois	3
601	sangamon	-89.98302	39.78619	84	1477	illinois	3
602	sangamon	-89.99448	39.78619	84	1478	illinois	3
603	sangamon	-89.99448	39.86641	84	1479	illinois	3
604	sangamon	-89.98875	39.90078	84	1480	illinois	3
605	sangamon	-89.75384	39.90078	84	1481	illinois	3
606	sangamon	-89.75384	39.91797	84	1482	illinois	3
607	sangamon	-89.69081	39.91797	84	1483	illinois	3
608	sangamon	-89.70228	39.96381	84	1484	illinois	3
609	sangamon	-89.68508	39.96381	84	1485	illinois	3

610	sangamon	-89.68508	39.97527	84	1486	illinois	3
611	sangamon	-89.57623	39.98100	84	1487	illinois	3
612	sangamon	-89.48455	39.98100	84	1488	illinois	3
613	sangamon	-89.49028	39.92943	84	1489	illinois	3
614	sangamon	-89.40434	39.92943	84	1490	illinois	3
615	sangamon	-89.40434	39.91797	84	1491	illinois	3
616	sangamon	-89.22099	39.91797	84	1492	illinois	3
617	sangamon	-89.22099	39.82630	84	1493	illinois	3
618	randolph	-90.20647	38.08450	79	1344	illinois	2
619	randolph	-90.03459	38.13607	79	1345	illinois	2
620	randolph	-90.03459	38.22202	79	1346	illinois	2
621	randolph	-89.90281	38.22202	79	1347	illinois	2
622	randolph	-89.70228	38.21629	79	1348	illinois	2
623	randolph	-89.58768	38.21629	79	1349	illinois	2
624	randolph	-89.58768	37.95272	79	1350	illinois	2
625	randolph	-89.61060	37.92408	79	1351	illinois	2
626	randolph	-89.65070	37.87251	79	1352	illinois	2
627	randolph	-89.65070	37.83813	79	1353	illinois	2
628	randolph	-89.67362	37.83241	79	1354	illinois	2
629	randolph	-89.67362	37.80376	79	1355	illinois	2
630	randolph	-89.71946	37.82094	79	1356	illinois	2
631	randolph	-89.83978	37.88970	79	1357	illinois	2
632	randolph	-89.90281	37.87824	79	1358	illinois	2
633	randolph	-89.93146	37.89543	79	1359	illinois	2
634	randolph	-89.98302	37.91835	79	1360	illinois	2
635	randolph	-89.98302	37.93554	79	1361	illinois	2
636	randolph	-89.94292	37.95272	79	1362	illinois	2
637	randolph	-89.93719	37.96991	79	1363	illinois	2
638	randolph	-89.95438	37.96991	79	1364	illinois	2
639	randolph	-90.00021	37.96991	79	1365	illinois	2
640	randolph	-90.12054	38.02721	79	1366	illinois	2
641	randolph	-90.16064	38.07304	79	1367	illinois	2
642	randolph	-90.19501	38.07878	79	1368	illinois	2
643	randolph	-90.20647	38.08450	79	1369	illinois	2
644	ogle	-89.68508	42.20407	71	1173	illinois	2
645	ogle	-89.39288	42.20407	71	1174	illinois	2
646	ogle	-89.16370	42.20407	71	1175	illinois	2
647	ogle	-89.16370	42.15824	71	1176	illinois	2
648	ogle	-88.94024	42.15824	71	1177	illinois	2
649	ogle	-88.94024	42.06656	71	1178	illinois	2
650	ogle	-88.94597	41.89467	71	1179	illinois	2
651	ogle	-89.35277	41.89467	71	1180	illinois	2
652	ogle	-89.35850	41.90614	71	1181	illinois	2

653	ogle	-89.40434	41.90614	71	1182	illinois	2
654	ogle	-89.41579	41.88895	71	1183	illinois	2
655	ogle	-89.43298	41.89467	71	1184	illinois	2
656	ogle	-89.44444	41.91759	71	1185	illinois	2
657	ogle	-89.46735	41.91187	71	1186	illinois	2
658	ogle	-89.48455	41.90614	71	1187	illinois	2
659	ogle	-89.63351	41.89467	71	1188	illinois	2
660	ogle	-89.63351	41.92905	71	1189	illinois	2
661	ogle	-89.68508	41.93478	71	1190	illinois	2
662	ogle	-89.68508	42.20407	71	1191	illinois	2
663	stephenson	-89.91999	42.20407	89	1572	illinois	2
664	stephenson	-89.91427	42.50201	89	1573	illinois	2
665	stephenson	-89.84551	42.50774	89	1574	illinois	2
666	stephenson	-89.39288	42.50201	89	1575	illinois	2
667	stephenson	-89.39288	42.20407	89	1576	illinois	2
668	stephenson	-89.68508	42.20407	89	1577	illinois	2
669	stephenson	-89.91999	42.20407	89	1578	illinois	2
670	white	-88.10372	37.90116	97	1705	illinois	1
671	white	-88.13237	37.90689	97	1706	illinois	1
672	white	-88.37874	37.90689	97	1707	illinois	1
673	white	-88.38447	38.25066	97	1708	illinois	1
674	white	-88.15528	38.25066	97	1709	illinois	1
675	white	-88.02351	38.25066	97	1710	illinois	1
676	white	-87.97194	38.23920	97	1711	illinois	1
677	white	-87.99486	38.23347	97	1712	illinois	1
678	white	-87.98913	38.19910	97	1713	illinois	1
679	white	-87.96621	38.17618	97	1714	illinois	1
680	white	-87.93183	38.17045	97	1715	illinois	1
681	white	-87.92037	38.15899	97	1716	illinois	1
682	white	-87.94329	38.13034	97	1717	illinois	1
683	white	-87.96621	38.08450	97	1718	illinois	1
684	white	-88.03497	38.04440	97	1719	illinois	1
685	white	-88.02351	38.01575	97	1720	illinois	1
686	white	-88.03497	37.94699	97	1721	illinois	1
687	white	-88.03497	37.91262	97	1722	illinois	1
688	white	-88.08080	37.90689	97	1723	illinois	1
689	white	-88.10372	37.90116	97	1724	illinois	1
690	henderson	-90.79662	41.06388	36	610	illinois	1
691	henderson	-90.79662	40.62271	36	611	illinois	1
692	henderson	-90.89976	40.63417	36	612	illinois	1
693	henderson	-91.18623	40.63417	36	613	illinois	1
694	henderson	-91.14613	40.65709	36	614	illinois	1
695	henderson	-91.11175	40.68000	36	615	illinois	1

696	henderson	-91.11175	40.70865	36	616 illinois	1
697	henderson	-91.10029	40.75449	36	617 illinois	1
698	henderson	-91.08883	40.82324	36	618 illinois	1
699	henderson	-91.04299	40.87481	36	619 illinois	1
700	henderson	-90.97424	40.93211	36	620 illinois	1
701	henderson	-90.95132	40.96648	36	621 illinois	1
702	henderson	-90.94559	41.06961	36	622 illinois	1
703	henderson	-90.79662	41.06388	36	623 illinois	1
704	mclean	-88.46468	40.60552	57	895 illinois	3
705	mclean	-88.45895	40.38780	57	896 illinois	3
706	mclean	-88.46468	40.27893	57	897 illinois	3
707	mclean	-88.57928	40.27893	57	898 illinois	3
708	mclean	-89.14077	40.27893	57	899 illinois	3
709	mclean	-89.26682	40.27893	57	900 illinois	3
710	mclean	-89.26682	40.32477	57	901 illinois	3
711	mclean	-89.26682	40.58833	57	902 illinois	3
712	mclean	-89.14077	40.58833	57	903 illinois	3
713	mclean	-89.13504	40.61125	57	904 illinois	3
714	mclean	-89.10066	40.60552	57	905 illinois	3
715	mclean	-89.10066	40.62271	57	906 illinois	3
716	mclean	-89.03764	40.62271	57	907 illinois	3
717	mclean	-89.03764	40.66282	57	908 illinois	3
718	mclean	-88.98608	40.65709	57	909 illinois	3
719	mclean	-88.98035	40.74876	57	910 illinois	3
720	mclean	-88.93451	40.74876	57	911 illinois	3
721	mclean	-88.59074	40.74876	57	912 illinois	3
722	mclean	-88.59074	40.65136	57	913 illinois	3
723	mclean	-88.57928	40.65136	57	914 illinois	3
724	mclean	-88.57928	40.60552	57	915 illinois	3
725	mclean	-88.46468	40.60552	57	916 illinois	3
726	pike	-91.36385	39.75754	75	1251 illinois	1
727	pike	-90.91694	39.75754	75	1252 illinois	1
728	pike	-90.91121	39.83775	75	1253 illinois	1
729	pike	-90.58463	39.83203	75	1254 illinois	1
730	pike	-90.60755	39.78619	75	1255 illinois	1
731	pike	-90.64192	39.73462	75	1256 illinois	1
732	pike	-90.65339	39.70024	75	1257 illinois	1
733	pike	-90.65339	39.67160	75	1258 illinois	1
734	pike	-90.58463	39.55701	75	1259 illinois	1
735	pike	-90.58463	39.52263	75	1260 illinois	1
736	pike	-90.60181	39.49398	75	1261 illinois	1
737	pike	-90.61328	39.45387	75	1262 illinois	1
738	pike	-90.63046	39.42522	75	1263 illinois	1

739	pike	-90.63619	39.39658	75	1264	illinois	1
740	pike	-90.93414	39.40231	75	1265	illinois	1
741	pike	-90.97997	39.41377	75	1266	illinois	1
742	pike	-91.03726	39.44241	75	1267	illinois	1
743	pike	-91.06592	39.45387	75	1268	illinois	1
744	pike	-91.10602	39.51117	75	1269	illinois	1
745	pike	-91.16331	39.56846	75	1270	illinois	1
746	pike	-91.18623	39.59711	75	1271	illinois	1
747	pike	-91.28363	39.68306	75	1272	illinois	1
748	pike	-91.33521	39.71170	75	1273	illinois	1
749	pike	-91.35239	39.73462	75	1274	illinois	1
750	pike	-91.36385	39.75754	75	1275	illinois	1
751	rock island	-90.24085	41.79154	81	1392	illinois	3
752	rock island	-90.24085	41.72279	81	1393	illinois	3
753	rock island	-90.23512	41.69987	81	1394	illinois	3
754	rock island	-90.21793	41.67695	81	1395	illinois	3
755	rock island	-90.18929	41.66549	81	1396	illinois	3
756	rock island	-90.16064	41.65976	81	1397	illinois	3
757	rock island	-90.16064	41.61966	81	1398	illinois	3
758	rock island	-90.17210	41.58527	81	1399	illinois	3
759	rock island	-90.18356	41.55090	81	1400	illinois	3
760	rock island	-90.21793	41.53371	81	1401	illinois	3
761	rock island	-90.24658	41.52225	81	1402	illinois	3
762	rock island	-90.29242	41.51652	81	1403	illinois	3
763	rock island	-90.36691	41.49934	81	1404	illinois	3
764	rock island	-90.37836	41.48214	81	1405	illinois	3
765	rock island	-90.42993	41.46495	81	1406	illinois	3
766	rock island	-90.43566	41.32745	81	1407	illinois	3
767	rock island	-91.06018	41.32745	81	1408	illinois	3
768	rock island	-91.06592	41.34464	81	1409	illinois	3
769	rock island	-91.03726	41.40766	81	1410	illinois	3
770	rock island	-91.01434	41.43058	81	1411	illinois	3
771	rock island	-90.98570	41.43058	81	1412	illinois	3
772	rock island	-90.92841	41.43058	81	1413	illinois	3
773	rock island	-90.87683	41.44777	81	1414	illinois	3
774	rock island	-90.83673	41.45350	81	1415	illinois	3
775	rock island	-90.77370	41.45922	81	1416	illinois	3
776	rock island	-90.71641	41.45922	81	1417	illinois	3
777	rock island	-90.65339	41.46495	81	1418	illinois	3
778	rock island	-90.60755	41.49934	81	1419	illinois	3
779	rock island	-90.54452	41.52225	81	1420	illinois	3
780	rock island	-90.45857	41.53944	81	1421	illinois	3
781	rock island	-90.41273	41.56236	81	1422	illinois	3

782	rock island	-90.35545	41.59674	81	1423	illinois	3
783	rock island	-90.34399	41.61966	81	1424	illinois	3
784	rock island	-90.32680	41.69414	81	1425	illinois	3
785	rock island	-90.32107	41.72279	81	1426	illinois	3
786	rock island	-90.30388	41.75716	81	1427	illinois	3
787	rock island	-90.26950	41.78008	81	1428	illinois	3
788	rock island	-90.24085	41.79154	81	1429	illinois	3
789	wabash	-87.95475	38.56579	93	1636	illinois	1
790	wabash	-87.91464	38.56579	93	1637	illinois	1
791	wabash	-87.66254	38.56579	93	1638	illinois	1
792	wabash	-87.67400	38.54287	93	1639	illinois	1
793	wabash	-87.67973	38.50850	93	1640	illinois	1
794	wabash	-87.72557	38.47984	93	1641	illinois	1
795	wabash	-87.74848	38.46839	93	1642	illinois	1
796	wabash	-87.74275	38.43974	93	1643	illinois	1
797	wabash	-87.75422	38.41109	93	1644	illinois	1
798	wabash	-87.79432	38.37099	93	1645	illinois	1
799	wabash	-87.81724	38.34233	93	1646	illinois	1
800	wabash	-87.82870	38.30223	93	1647	illinois	1
801	wabash	-87.83443	38.29077	93	1648	illinois	1
802	wabash	-87.87453	38.29650	93	1649	illinois	1
803	wabash	-87.89746	38.27358	93	1650	illinois	1
804	wabash	-87.92037	38.29077	93	1651	illinois	1
805	wabash	-87.94329	38.29650	93	1652	illinois	1
806	wabash	-87.95475	38.34233	93	1653	illinois	1
807	wabash	-87.96621	38.36525	93	1654	illinois	1
808	wabash	-87.94902	38.41682	93	1655	illinois	1
809	wabash	-87.94902	38.45120	93	1656	illinois	1
810	wabash	-87.94902	38.47412	93	1657	illinois	1
811	wabash	-87.95475	38.50850	93	1658	illinois	1
812	wabash	-87.94902	38.51995	93	1659	illinois	1
813	wabash	-87.94902	38.53714	93	1660	illinois	1
814	wabash	-87.95475	38.56579	93	1661	illinois	1
815	cumberland	-88.01778	39.37939	18	351	illinois	1
816	cumberland	-88.01778	39.17313	18	352	illinois	1
817	cumberland	-88.36728	39.17313	18	353	illinois	1
818	cumberland	-88.47614	39.17313	18	354	illinois	1
819	cumberland	-88.47614	39.21323	18	355	illinois	1
820	cumberland	-88.47614	39.37366	18	356	illinois	1
821	cumberland	-88.01778	39.37939	18	357	illinois	1
822	kane	-88.57928	42.15824	45	753	illinois	6
823	kane	-88.24696	42.15824	45	754	illinois	6
824	kane	-88.24696	42.08375	45	755	illinois	6

825	kane	-88.26987	42.06656	45	756 illinois	6
826	kane	-88.27560	41.98635	45	757 illinois	6
827	kane	-88.27560	41.72279	45	758 illinois	6
828	kane	-88.59074	41.72279	45	759 illinois	6
829	kane	-88.59074	42.06656	45	760 illinois	6
830	kane	-88.57928	42.06656	45	761 illinois	6
831	kane	-88.57928	42.15824	45	762 illinois	6
832	brown	-90.91121	39.83775	5	78 illinois	1
833	brown	-90.91121	40.10704	5	79 illinois	1
834	brown	-90.72214	40.10704	5	80 illinois	1
835	brown	-90.69922	40.08986	5	81 illinois	1
836	brown	-90.68203	40.04975	5	82 illinois	1
837	brown	-90.65339	40.03829	5	83 illinois	1
838	brown	-90.61328	40.01537	5	84 illinois	1
839	brown	-90.60755	39.97527	5	85 illinois	1
840	brown	-90.58463	39.97527	5	86 illinois	1
841	brown	-90.51014	39.98672	5	87 illinois	1
842	brown	-90.52734	39.96381	5	88 illinois	1
843	brown	-90.54452	39.92943	5	89 illinois	1
844	brown	-90.58463	39.88359	5	90 illinois	1
845	brown	-90.58463	39.86641	5	91 illinois	1
846	brown	-90.58463	39.83203	5	92 illinois	1
847	brown	-90.91121	39.83775	5	93 illinois	1
848	marshall	-89.63924	40.97221	62	977 illinois	1
849	marshall	-89.63924	41.14410	62	978 illinois	1
850	marshall	-89.46735	41.14410	62	979 illinois	1
851	marshall	-89.33558	41.14410	62	980 illinois	1
852	marshall	-89.33558	41.10399	62	981 illinois	1
853	marshall	-89.16370	41.10972	62	982 illinois	1
854	marshall	-89.04910	41.10399	62	983 illinois	1
855	marshall	-89.04337	40.92637	62	984 illinois	1
856	marshall	-89.45590	40.92637	62	985 illinois	1
857	marshall	-89.44444	40.97221	62	986 illinois	1
858	marshall	-89.63924	40.97221	62	987 illinois	1
859	christian	-89.02618	39.65441	11	205 illinois	2
860	christian	-89.03191	39.35074	11	206 illinois	2
861	christian	-89.14077	39.35074	11	207 illinois	2
862	christian	-89.53612	39.35074	11	208 illinois	2
863	christian	-89.54185	39.52263	11	209 illinois	2
864	christian	-89.54185	39.63722	11	210 illinois	2
865	christian	-89.47882	39.63722	11	211 illinois	2
866	christian	-89.47882	39.68306	11	212 illinois	2
867	christian	-89.42725	39.68306	11	213 illinois	2

868	christian	-89.42152	39.75754	11	214	illinois	2
869	christian	-89.38715	39.74608	11	215	illinois	2
870	christian	-89.35850	39.75754	11	216	illinois	2
871	christian	-89.31266	39.76900	11	217	illinois	2
872	christian	-89.27828	39.79765	11	218	illinois	2
873	christian	-89.27828	39.80911	11	219	illinois	2
874	christian	-89.25537	39.81483	11	220	illinois	2
875	christian	-89.23817	39.82630	11	221	illinois	2
876	christian	-89.22099	39.82630	11	222	illinois	2
877	christian	-89.18088	39.79765	11	223	illinois	2
878	christian	-89.14650	39.79192	11	224	illinois	2
879	christian	-89.14077	39.78046	11	225	illinois	2
880	christian	-89.14077	39.65441	11	226	illinois	2
881	christian	-89.02618	39.65441	11	227	illinois	2
882	jackson	-89.67362	37.80376	39	656	illinois	2
883	jackson	-89.67362	37.83241	39	657	illinois	2
884	jackson	-89.65070	37.83813	39	658	illinois	2
885	jackson	-89.65070	37.87251	39	659	illinois	2
886	jackson	-89.61060	37.92408	39	660	illinois	2
887	jackson	-89.58768	37.95272	39	661	illinois	2
888	jackson	-89.17515	37.95845	39	662	illinois	2
889	jackson	-89.15223	37.95845	39	663	illinois	2
890	jackson	-89.15223	37.86105	39	664	illinois	2
891	jackson	-89.15223	37.60895	39	665	illinois	2
892	jackson	-89.44444	37.60322	39	666	illinois	2
893	jackson	-89.45590	37.57457	39	667	illinois	2
894	jackson	-89.47882	37.57457	39	668	illinois	2
895	jackson	-89.49601	37.58030	39	669	illinois	2
896	jackson	-89.51893	37.58030	39	670	illinois	2
897	jackson	-89.50174	37.64906	39	671	illinois	2
898	jackson	-89.51319	37.67198	39	672	illinois	2
899	jackson	-89.54757	37.68916	39	673	illinois	2
900	jackson	-89.64497	37.74646	39	674	illinois	2
901	jackson	-89.65644	37.77511	39	675	illinois	2
902	jackson	-89.67362	37.80376	39	676	illinois	2
903	union	-89.51893	37.56311	91	1606	illinois	1
904	union	-89.51893	37.58030	91	1607	illinois	1
905	union	-89.49601	37.58030	91	1608	illinois	1
906	union	-89.47882	37.57457	91	1609	illinois	1
907	union	-89.45590	37.57457	91	1610	illinois	1
908	union	-89.44444	37.60322	91	1611	illinois	1
909	union	-89.15223	37.60895	91	1612	illinois	1
910	union	-89.04910	37.60322	91	1613	illinois	1

911	union	-89.04910	37.33393	91	1614	illinois	1
912	union	-89.21526	37.34539	91	1615	illinois	1
913	union	-89.47309	37.33393	91	1616	illinois	1
914	union	-89.43298	37.36258	91	1617	illinois	1
915	union	-89.42152	37.37977	91	1618	illinois	1
916	union	-89.44444	37.43706	91	1619	illinois	1
917	union	-89.50746	37.53447	91	1620	illinois	1
918	union	-89.51893	37.56311	91	1621	illinois	1
919	saline	-88.40166	37.60322	83	1451	illinois	1
920	saline	-88.71106	37.60322	83	1452	illinois	1
921	saline	-88.71106	37.86678	83	1453	illinois	1
922	saline	-88.70533	37.90689	83	1454	illinois	1
923	saline	-88.37874	37.90689	83	1455	illinois	1
924	saline	-88.37874	37.60322	83	1456	illinois	1
925	saline	-88.40166	37.60322	83	1457	illinois	1
926	whiteside	-89.63351	41.89467	98	1726	illinois	2
927	whiteside	-89.63351	41.59101	98	1727	illinois	2
928	whiteside	-89.85124	41.59101	98	1728	illinois	2
929	whiteside	-90.17210	41.58527	98	1729	illinois	2
930	whiteside	-90.16064	41.61966	98	1730	illinois	2
931	whiteside	-90.16064	41.65976	98	1731	illinois	2
932	whiteside	-90.18929	41.66549	98	1732	illinois	2
933	whiteside	-90.21793	41.67695	98	1733	illinois	2
934	whiteside	-90.23512	41.69987	98	1734	illinois	2
935	whiteside	-90.24085	41.72279	98	1735	illinois	2
936	whiteside	-90.24085	41.79154	98	1736	illinois	2
937	whiteside	-90.18929	41.82019	98	1737	illinois	2
938	whiteside	-90.17783	41.83738	98	1738	illinois	2
939	whiteside	-90.16064	41.89467	98	1739	illinois	2
940	whiteside	-90.16064	41.93478	98	1740	illinois	2
941	whiteside	-89.68508	41.93478	98	1741	illinois	2
942	whiteside	-89.63351	41.92905	98	1742	illinois	2
943	whiteside	-89.63351	41.89467	98	1743	illinois	2
945	jasper	-88.36728	39.17313	40	678	illinois	1
946	jasper	-88.01778	39.17313	40	679	illinois	1
947	jasper	-87.95475	39.17313	40	680	illinois	1
948	jasper	-87.95475	38.85227	40	681	illinois	1
949	jasper	-88.26987	38.85227	40	682	illinois	1
950	jasper	-88.36728	38.85800	40	683	illinois	1
951	jasper	-88.36728	38.91529	40	684	illinois	1
952	jasper	-88.36728	39.17313	40	685	illinois	1
953	will	-88.26415	41.46495	99	1745	illinois	6
954	will	-88.27560	41.72279	99	1746	illinois	6

955	will	-88.02924	41.72279	99	1747	illinois	6
956	will	-88.03497	41.66549	99	1748	illinois	6
957	will	-88.03497	41.64257	99	1749	illinois	6
958	will	-87.92037	41.64257	99	1750	illinois	6
959	will	-87.91464	41.56236	99	1751	illinois	6
960	will	-87.79432	41.55090	99	1752	illinois	6
961	will	-87.79432	41.46495	99	1753	illinois	6
962	will	-87.52503	41.46495	99	1754	illinois	6
963	will	-87.52503	41.29307	99	1755	illinois	6
964	will	-88.02351	41.28734	99	1756	illinois	6
965	will	-88.02351	41.20139	99	1757	illinois	6
966	will	-88.24696	41.20139	99	1758	illinois	6
967	will	-88.26415	41.46495	99	1759	illinois	6
968	douglas	-87.94329	39.87214	21	383	illinois	1
969	douglas	-87.93757	39.79765	21	384	illinois	1
970	douglas	-87.95475	39.79765	21	385	illinois	1
971	douglas	-87.97194	39.68306	21	386	illinois	1
972	douglas	-88.06934	39.68306	21	387	illinois	1
973	douglas	-88.06934	39.65441	21	388	illinois	1
974	douglas	-88.47614	39.64295	21	389	illinois	1
975	douglas	-88.47614	39.79192	21	390	illinois	1
976	douglas	-88.47041	39.87214	21	391	illinois	1
977	douglas	-87.94329	39.87214	21	392	illinois	1
978	greene	-90.58463	39.52263	31	531	illinois	1
979	greene	-90.30388	39.52263	31	532	illinois	1
980	greene	-90.14918	39.52263	31	533	illinois	1
981	greene	-90.16064	39.35647	31	534	illinois	1
982	greene	-90.14918	39.35074	31	535	illinois	1
983	greene	-90.14918	39.26480	31	536	illinois	1
984	greene	-90.20075	39.26480	31	537	illinois	1
985	greene	-90.20647	39.22469	31	538	illinois	1
986	greene	-90.32680	39.23042	31	539	illinois	1
987	greene	-90.32680	39.17313	31	540	illinois	1
988	greene	-90.51588	39.17885	31	541	illinois	1
989	greene	-90.52161	39.19032	31	542	illinois	1
990	greene	-90.56171	39.19032	31	543	illinois	1
991	greene	-90.58463	39.17313	31	544	illinois	1
992	greene	-90.59035	39.15021	31	545	illinois	1
993	greene	-90.60755	39.11583	31	546	illinois	1
994	greene	-90.61328	39.17313	31	547	illinois	1
995	greene	-90.60755	39.20750	31	548	illinois	1
996	greene	-90.60755	39.23042	31	549	illinois	1
997	greene	-90.62473	39.27626	31	550	illinois	1

998	greene	-90.63046	39.32209	31	551 illinois	1
999	greene	-90.63619	39.36220	31	552 illinois	1
1000	greene	-90.63619	39.39658	31	553 illinois	1
1001	greene	-90.63046	39.42522	31	554 illinois	1
1002	greene	-90.61328	39.45387	31	555 illinois	1
1003	greene	-90.60181	39.49398	31	556 illinois	1
1004	greene	-90.58463	39.52263	31	557 illinois	1
1005	hardin	-88.37301	37.43133	35	595 illinois	1
1006	hardin	-88.40166	37.43133	35	596 illinois	1
1007	hardin	-88.40166	37.60322	35	597 illinois	1
1008	hardin	-88.37874	37.60322	35	598 illinois	1
1009	hardin	-88.18966	37.60322	35	599 illinois	1
1010	hardin	-88.12664	37.58603	35	600 illinois	1
1011	hardin	-88.10372	37.54593	35	601 illinois	1
1012	hardin	-88.08080	37.50582	35	602 illinois	1
1013	hardin	-88.08653	37.49436	35	603 illinois	1
1014	hardin	-88.11518	37.48290	35	604 illinois	1
1015	hardin	-88.18394	37.47717	35	605 illinois	1
1016	hardin	-88.26415	37.45998	35	606 illinois	1
1017	hardin	-88.34437	37.43706	35	607 illinois	1
1018	hardin	-88.37301	37.43133	35	608 illinois	1
1019	knox	-90.44139	41.14410	48	782 illinois	2
1020	knox	-89.98875	41.14410	48	783 illinois	2
1021	knox	-89.98875	40.97221	48	784 illinois	2
1022	knox	-89.98875	40.71438	48	785 illinois	2
1023	knox	-90.44712	40.71438	48	786 illinois	2
1024	knox	-90.44139	41.06388	48	787 illinois	2
1025	knox	-90.44139	41.14410	48	788 illinois	2
1026	massac	-88.93451	37.23653	64	1036 illinois	1
1027	massac	-88.92878	37.31101	64	1037 illinois	1
1028	massac	-88.91732	37.31674	64	1038 illinois	1
1029	massac	-88.91732	37.32820	64	1039 illinois	1
1030	massac	-88.94024	37.34539	64	1040 illinois	1
1031	massac	-88.71106	37.34539	64	1041 illinois	1
1032	massac	-88.49906	37.16777	64	1042 illinois	1
1033	massac	-88.49906	37.08183	64	1043 illinois	1
1034	massac	-88.55063	37.08756	64	1044 illinois	1
1035	massac	-88.58501	37.09901	64	1045 illinois	1
1036	massac	-88.64230	37.13340	64	1046 illinois	1
1037	massac	-88.73397	37.15631	64	1047 illinois	1
1038	massac	-88.75117	37.16777	64	1048 illinois	1
1039	massac	-88.81419	37.19642	64	1049 illinois	1
1040	massac	-88.85429	37.21934	64	1050 illinois	1

1041	massac	-88.93451	37.23653	64	1051	illinois	1
1042	tazewell	-89.26682	40.58833	90	1580	illinois	3
1043	tazewell	-89.26682	40.32477	90	1581	illinois	3
1044	tazewell	-89.58768	40.31904	90	1582	illinois	3
1045	tazewell	-89.71946	40.31904	90	1583	illinois	3
1046	tazewell	-89.72519	40.43363	90	1584	illinois	3
1047	tazewell	-89.91427	40.42790	90	1585	illinois	3
1048	tazewell	-89.88562	40.46228	90	1586	illinois	3
1049	tazewell	-89.87416	40.49093	90	1587	illinois	3
1050	tazewell	-89.86843	40.50812	90	1588	illinois	3
1051	tazewell	-89.82259	40.53104	90	1589	illinois	3
1052	tazewell	-89.78249	40.54249	90	1590	illinois	3
1053	tazewell	-89.73665	40.54823	90	1591	illinois	3
1054	tazewell	-89.72519	40.55395	90	1592	illinois	3
1055	tazewell	-89.68508	40.54823	90	1593	illinois	3
1056	tazewell	-89.66217	40.57687	90	1594	illinois	3
1057	tazewell	-89.65644	40.60552	90	1595	illinois	3
1058	tazewell	-89.63351	40.63417	90	1596	illinois	3
1059	tazewell	-89.62206	40.65709	90	1597	illinois	3
1060	tazewell	-89.55903	40.70865	90	1598	illinois	3
1061	tazewell	-89.55330	40.73157	90	1599	illinois	3
1062	tazewell	-89.55330	40.75449	90	1600	illinois	3
1063	tazewell	-89.32985	40.74876	90	1601	illinois	3
1064	tazewell	-89.32412	40.60552	90	1602	illinois	3
1065	tazewell	-89.26682	40.60552	90	1603	illinois	3
1066	tazewell	-89.26682	40.58833	90	1604	illinois	3
1067	winnebago	-89.39288	42.20407	101	1768	illinois	5
1068	winnebago	-89.39288	42.50201	101	1769	illinois	5
1069	winnebago	-89.37569	42.50201	101	1770	illinois	5
1070	winnebago	-88.94024	42.49628	101	1771	illinois	5
1071	winnebago	-88.94024	42.15824	101	1772	illinois	5
1072	winnebago	-89.16370	42.15824	101	1773	illinois	5
1073	winnebago	-89.16370	42.20407	101	1774	illinois	5
1074	winnebago	-89.39288	42.20407	101	1775	illinois	5
1075	piatt	-88.75117	39.79192	74	1237	illinois	1
1076	piatt	-88.73970	40.05548	74	1238	illinois	1
1077	piatt	-88.73970	40.09559	74	1239	illinois	1
1078	piatt	-88.68813	40.08986	74	1240	illinois	1
1079	piatt	-88.68240	40.10704	74	1241	illinois	1
1080	piatt	-88.68813	40.14143	74	1242	illinois	1
1081	piatt	-88.57928	40.27893	74	1243	illinois	1
1082	piatt	-88.46468	40.27893	74	1244	illinois	1
1083	piatt	-88.46468	40.21591	74	1245	illinois	1

1084	piatt	-88.47614	40.21018	74	1246	illinois	1
1085	piatt	-88.47041	39.87214	74	1247	illinois	1
1086	piatt	-88.47614	39.79192	74	1248	illinois	1
1087	piatt	-88.75117	39.79192	74	1249	illinois	1
1088	pulaski	-88.93451	37.23653	77	1296	illinois	1
1089	pulaski	-88.97462	37.24226	77	1297	illinois	1
1090	pulaski	-89.01472	37.23653	77	1298	illinois	1
1091	pulaski	-89.06055	37.21934	77	1299	illinois	1
1092	pulaski	-89.09493	37.19069	77	1300	illinois	1
1093	pulaski	-89.11213	37.14485	77	1301	illinois	1
1094	pulaski	-89.14650	37.12193	77	1302	illinois	1
1095	pulaski	-89.18088	37.07037	77	1303	illinois	1
1096	pulaski	-89.19807	37.09329	77	1304	illinois	1
1097	pulaski	-89.20953	37.09901	77	1305	illinois	1
1098	pulaski	-89.24964	37.09901	77	1306	illinois	1
1099	pulaski	-89.26109	37.11048	77	1307	illinois	1
1100	pulaski	-89.27255	37.13912	77	1308	illinois	1
1101	pulaski	-89.26682	37.15631	77	1309	illinois	1
1102	pulaski	-89.27255	37.17923	77	1310	illinois	1
1103	pulaski	-89.26682	37.19642	77	1311	illinois	1
1104	pulaski	-89.26682	37.20788	77	1312	illinois	1
1105	pulaski	-89.26682	37.21934	77	1313	illinois	1
1106	pulaski	-89.25537	37.23653	77	1314	illinois	1
1107	pulaski	-89.24964	37.27090	77	1315	illinois	1
1108	pulaski	-89.20953	37.29955	77	1316	illinois	1
1109	pulaski	-89.19807	37.31101	77	1317	illinois	1
1110	pulaski	-89.20380	37.32247	77	1318	illinois	1
1111	pulaski	-89.21526	37.34539	77	1319	illinois	1
1112	pulaski	-89.04910	37.33393	77	1320	illinois	1
1113	pulaski	-89.04910	37.31674	77	1321	illinois	1
1114	pulaski	-89.02618	37.32247	77	1322	illinois	1
1115	pulaski	-88.99754	37.32820	77	1323	illinois	1
1116	pulaski	-88.98035	37.31674	77	1324	illinois	1
1117	pulaski	-88.96316	37.31101	77	1325	illinois	1
1118	pulaski	-88.94597	37.30528	77	1326	illinois	1
1119	pulaski	-88.92878	37.31101	77	1327	illinois	1
1120	pulaski	-88.93451	37.23653	77	1328	illinois	1
1121	schuyler	-90.91121	40.27893	85	1495	illinois	1
1122	schuyler	-90.45284	40.27320	85	1496	illinois	1
1123	schuyler	-90.45284	40.18726	85	1497	illinois	1
1124	schuyler	-90.20075	40.18726	85	1498	illinois	1
1125	schuyler	-90.20647	40.15861	85	1499	illinois	1
1126	schuyler	-90.22366	40.14715	85	1500	illinois	1

1127	schuyler	-90.25804	40.14715	85	1501	illinois	1
1128	schuyler	-90.29815	40.14715	85	1502	illinois	1
1129	schuyler	-90.32107	40.13569	85	1503	illinois	1
1130	schuyler	-90.33826	40.13569	85	1504	illinois	1
1131	schuyler	-90.36118	40.11851	85	1505	illinois	1
1132	schuyler	-90.37836	40.10704	85	1506	illinois	1
1133	schuyler	-90.38409	40.08986	85	1507	illinois	1
1134	schuyler	-90.41273	40.07267	85	1508	illinois	1
1135	schuyler	-90.42993	40.04402	85	1509	illinois	1
1136	schuyler	-90.44712	40.02110	85	1510	illinois	1
1137	schuyler	-90.49295	39.99818	85	1511	illinois	1
1138	schuyler	-90.51014	39.98672	85	1512	illinois	1
1139	schuyler	-90.58463	39.97527	85	1513	illinois	1
1140	schuyler	-90.60755	39.97527	85	1514	illinois	1
1141	schuyler	-90.61328	40.01537	85	1515	illinois	1
1142	schuyler	-90.65339	40.03829	85	1516	illinois	1
1143	schuyler	-90.68203	40.04975	85	1517	illinois	1
1144	schuyler	-90.69922	40.08986	85	1518	illinois	1
1145	schuyler	-90.72214	40.10704	85	1519	illinois	1
1146	schuyler	-90.91121	40.10704	85	1520	illinois	1
1147	schuyler	-90.91121	40.19299	85	1521	illinois	1
1148	schuyler	-90.91121	40.27893	85	1522	illinois	1
1149	stark	-89.98875	40.97221	88	1562	illinois	1
1150	stark	-89.98875	41.14410	88	1563	illinois	1
1151	stark	-89.85697	41.14410	88	1564	illinois	1
1152	stark	-89.85697	41.24150	88	1565	illinois	1
1153	stark	-89.83405	41.24150	88	1566	illinois	1
1154	stark	-89.63924	41.24150	88	1567	illinois	1
1155	stark	-89.63924	41.14410	88	1568	illinois	1
1156	stark	-89.63924	40.97221	88	1569	illinois	1
1157	stark	-89.98875	40.97221	88	1570	illinois	1
1158	edgar	-87.53076	39.60857	23	405	illinois	1
1159	edgar	-87.53649	39.47106	23	406	illinois	1
1160	edgar	-87.69691	39.47106	23	407	illinois	1
1161	edgar	-87.70264	39.48825	23	408	illinois	1
1162	edgar	-87.97194	39.48252	23	409	illinois	1
1163	edgar	-87.97194	39.68306	23	410	illinois	1
1164	edgar	-87.95475	39.79765	23	411	illinois	1
1165	edgar	-87.93757	39.79765	23	412	illinois	1
1166	edgar	-87.94329	39.87214	23	413	illinois	1
1167	edgar	-87.62817	39.87214	23	414	illinois	1
1168	edgar	-87.62244	39.86641	23	415	illinois	1
1169	edgar	-87.53649	39.86641	23	416	illinois	1

1170	edgar	-87.53076	39.60857	23	417 illinois	1
1171	bond	-89.27828	38.73195	3	59 illinois	1
1172	bond	-89.59341	38.73768	3	60 illinois	1
1173	bond	-89.59914	38.87519	3	61 illinois	1
1174	bond	-89.63924	38.87519	3	62 illinois	1
1175	bond	-89.63924	39.00124	3	63 illinois	1
1176	bond	-89.58768	39.00697	3	64 illinois	1
1177	bond	-89.58768	39.02989	3	65 illinois	1
1178	bond	-89.26109	39.02989	3	66 illinois	1
1179	bond	-89.26109	39.00697	3	67 illinois	1
1180	bond	-89.27828	39.00697	3	68 illinois	1
1181	bond	-89.27828	38.73195	3	69 illinois	1
1182	boone	-88.94024	42.15824	4	71 illinois	2
1183	boone	-88.94024	42.49628	4	72 illinois	2
1184	boone	-88.77408	42.50201	4	73 illinois	2
1185	boone	-88.69959	42.50201	4	74 illinois	2
1186	boone	-88.70533	42.15824	4	75 illinois	2
1187	boone	-88.94024	42.15824	4	76 illinois	2
1188	bureau	-89.63351	41.59101	6	95 illinois	2
1189	bureau	-89.16370	41.59101	6	96 illinois	2
1190	bureau	-89.16943	41.31026	6	97 illinois	2
1191	bureau	-89.21526	41.31599	6	98 illinois	2
1192	bureau	-89.26682	41.31599	6	99 illinois	2
1193	bureau	-89.30120	41.31026	6	100 illinois	2
1194	bureau	-89.33558	41.30453	6	101 illinois	2
1195	bureau	-89.34131	41.25296	6	102 illinois	2
1196	bureau	-89.36423	41.24150	6	103 illinois	2
1197	bureau	-89.45590	41.24150	6	104 illinois	2
1198	bureau	-89.46735	41.14410	6	105 illinois	2
1199	bureau	-89.63924	41.14410	6	106 illinois	2
1200	bureau	-89.63924	41.24150	6	107 illinois	2
1201	bureau	-89.83405	41.24150	6	108 illinois	2
1202	bureau	-89.83405	41.48214	6	109 illinois	2
1203	bureau	-89.85124	41.48214	6	110 illinois	2
1204	bureau	-89.85124	41.59101	6	111 illinois	2
1205	bureau	-89.63351	41.59101	6	112 illinois	2
1206	carroll	-89.91999	42.20407	8	149 illinois	1
1207	carroll	-89.68508	42.20407	8	150 illinois	1
1208	carroll	-89.68508	41.93478	8	151 illinois	1
1209	carroll	-90.16064	41.93478	8	152 illinois	1
1210	carroll	-90.14918	41.96343	8	153 illinois	1
1211	carroll	-90.13772	42.00927	8	154 illinois	1
1212	carroll	-90.14918	42.03791	8	155 illinois	1

1213	carroll	-90.16064	42.10094	8	156 illinois	1
1214	carroll	-90.17783	42.13532	8	157 illinois	1
1215	carroll	-90.24658	42.17542	8	158 illinois	1
1216	carroll	-90.32680	42.20407	8	159 illinois	1
1217	carroll	-89.91999	42.20407	8	160 illinois	1
1218	coles	-87.97194	39.68306	15	294 illinois	2
1219	coles	-87.97194	39.48252	15	295 illinois	2
1220	coles	-88.01778	39.48252	15	296 illinois	2
1221	coles	-88.01778	39.37939	15	297 illinois	2
1222	coles	-88.47614	39.37366	15	298 illinois	2
1223	coles	-88.47614	39.44241	15	299 illinois	2
1224	coles	-88.47614	39.64295	15	300 illinois	2
1225	coles	-88.06934	39.65441	15	301 illinois	2
1226	coles	-88.06934	39.68306	15	302 illinois	2
1227	coles	-87.97194	39.68306	15	303 illinois	2
1228	crawford	-87.53649	38.90956	17	334 illinois	1
1229	crawford	-87.54795	38.85227	17	335 illinois	1
1230	crawford	-87.91464	38.85227	17	336 illinois	1
1231	crawford	-87.95475	38.85227	17	337 illinois	1
1232	crawford	-87.95475	39.17313	17	338 illinois	1
1233	crawford	-87.75995	39.17885	17	339 illinois	1
1234	crawford	-87.75995	39.16740	17	340 illinois	1
1235	crawford	-87.63390	39.17313	17	341 illinois	1
1236	crawford	-87.67400	39.14448	17	342 illinois	1
1237	crawford	-87.65681	39.12156	17	343 illinois	1
1238	crawford	-87.59379	39.08145	17	344 illinois	1
1239	crawford	-87.57660	39.06426	17	345 illinois	1
1240	crawford	-87.57087	39.00124	17	346 illinois	1
1241	crawford	-87.53076	38.97259	17	347 illinois	1
1242	crawford	-87.52503	38.94967	17	348 illinois	1
1243	crawford	-87.53649	38.90956	17	349 illinois	1
1244	jersey	-90.45284	38.96113	42	696 illinois	1
1245	jersey	-90.49295	38.96686	42	697 illinois	1
1246	jersey	-90.52161	38.94967	42	698 illinois	1
1247	jersey	-90.56171	38.96113	42	699 illinois	1
1248	jersey	-90.57890	38.98978	42	700 illinois	1
1249	jersey	-90.57890	39.03561	42	701 illinois	1
1250	jersey	-90.60181	39.08145	42	702 illinois	1
1251	jersey	-90.60755	39.11583	42	703 illinois	1
1252	jersey	-90.59035	39.15021	42	704 illinois	1
1253	jersey	-90.58463	39.17313	42	705 illinois	1
1254	jersey	-90.56171	39.19032	42	706 illinois	1
1255	jersey	-90.52161	39.19032	42	707 illinois	1

1256	jersey	-90.51588	39.17885	42	708 illinois	1
1257	jersey	-90.32680	39.17313	42	709 illinois	1
1258	jersey	-90.32680	39.23042	42	710 illinois	1
1259	jersey	-90.20647	39.22469	42	711 illinois	1
1260	jersey	-90.20075	39.26480	42	712 illinois	1
1261	jersey	-90.14918	39.26480	42	713 illinois	1
1262	jersey	-90.14918	39.00697	42	714 illinois	1
1263	jersey	-90.28096	39.00124	42	715 illinois	1
1264	jersey	-90.26950	38.92675	42	716 illinois	1
1265	jersey	-90.31534	38.92675	42	717 illinois	1
1266	jersey	-90.37263	38.94394	42	718 illinois	1
1267	jersey	-90.40701	38.94967	42	719 illinois	1
1268	jersey	-90.45284	38.96113	42	720 illinois	1
1269	putnam	-89.16370	41.10972	78	1330 illinois	1
1270	putnam	-89.33558	41.10399	78	1331 illinois	1
1271	putnam	-89.33558	41.14410	78	1332 illinois	1
1272	putnam	-89.46735	41.14410	78	1333 illinois	1
1273	putnam	-89.45590	41.24150	78	1334 illinois	1
1274	putnam	-89.36423	41.24150	78	1335 illinois	1
1275	putnam	-89.34131	41.25296	78	1336 illinois	1
1276	putnam	-89.33558	41.30453	78	1337 illinois	1
1277	putnam	-89.30120	41.31026	78	1338 illinois	1
1278	putnam	-89.26682	41.31599	78	1339 illinois	1
1279	putnam	-89.21526	41.31599	78	1340 illinois	1
1280	putnam	-89.16943	41.31026	78	1341 illinois	1
1281	putnam	-89.16370	41.10972	78	1342 illinois	1
1282	de witt	-89.14077	40.04975	20	373 illinois	1
1283	de witt	-89.14077	40.27893	20	374 illinois	1
1284	de witt	-88.57928	40.27893	20	375 illinois	1
1285	de witt	-88.68813	40.14143	20	376 illinois	1
1286	de witt	-88.68240	40.10704	20	377 illinois	1
1287	de witt	-88.68813	40.08986	20	378 illinois	1
1288	de witt	-88.73970	40.09559	20	379 illinois	1
1289	de witt	-88.73970	40.05548	20	380 illinois	1
1290	de witt	-89.14077	40.04975	20	381 illinois	1
1291	fayette	-88.69959	38.90956	26	445 illinois	1
1292	fayette	-88.69959	38.82935	26	446 illinois	1
1293	fayette	-89.14077	38.82935	26	447 illinois	1
1294	fayette	-89.14650	38.73195	26	448 illinois	1
1295	fayette	-89.27828	38.73195	26	449 illinois	1
1296	fayette	-89.27828	39.00697	26	450 illinois	1
1297	fayette	-89.26109	39.00697	26	451 illinois	1
1298	fayette	-89.26109	39.02989	26	452 illinois	1

1299	fayette	-89.26109	39.21896	26	453	illinois	1
1300	fayette	-89.14077	39.21896	26	454	illinois	1
1301	fayette	-88.80273	39.21896	26	455	illinois	1
1302	fayette	-88.80273	38.91529	26	456	illinois	1
1303	fayette	-88.69959	38.90956	26	457	illinois	1
1304	lee	-88.94597	41.89467	52	830	illinois	2
1305	lee	-88.94024	41.71706	52	831	illinois	2
1306	lee	-88.92305	41.71706	52	832	illinois	2
1307	lee	-88.91732	41.63111	52	833	illinois	2
1308	lee	-89.16370	41.63111	52	834	illinois	2
1309	lee	-89.16370	41.59101	52	835	illinois	2
1310	lee	-89.63351	41.59101	52	836	illinois	2
1311	lee	-89.63351	41.89467	52	837	illinois	2
1312	lee	-89.48455	41.90614	52	838	illinois	2
1313	lee	-89.46735	41.91187	52	839	illinois	2
1314	lee	-89.44444	41.91759	52	840	illinois	2
1315	lee	-89.43298	41.89467	52	841	illinois	2
1316	lee	-89.41579	41.88895	52	842	illinois	2
1317	lee	-89.40434	41.90614	52	843	illinois	2
1318	lee	-89.35850	41.90614	52	844	illinois	2
1319	lee	-89.35277	41.89467	52	845	illinois	2
1320	lee	-88.94597	41.89467	52	846	illinois	2
1321	logan	-89.58768	40.31904	54	862	illinois	2
1322	logan	-89.26682	40.32477	54	863	illinois	2
1323	logan	-89.26682	40.27893	54	864	illinois	2
1324	logan	-89.14077	40.27893	54	865	illinois	2
1325	logan	-89.14077	40.04975	54	866	illinois	2
1326	logan	-89.14650	39.91797	54	867	illinois	2
1327	logan	-89.22099	39.91797	54	868	illinois	2
1328	logan	-89.40434	39.91797	54	869	illinois	2
1329	logan	-89.40434	39.92943	54	870	illinois	2
1330	logan	-89.49028	39.92943	54	871	illinois	2
1331	logan	-89.48455	39.98100	54	872	illinois	2
1332	logan	-89.57623	39.98100	54	873	illinois	2
1333	logan	-89.57623	40.09559	54	874	illinois	2
1334	logan	-89.60487	40.09559	54	875	illinois	2
1335	logan	-89.59914	40.12996	54	876	illinois	2
1336	logan	-89.58768	40.31904	54	877	illinois	2
1337	macoupin	-89.91999	39.52263	59	935	illinois	2
1338	macoupin	-89.69081	39.52263	59	936	illinois	2
1339	macoupin	-89.70228	39.36220	59	937	illinois	2
1340	macoupin	-89.70228	39.00697	59	938	illinois	2
1341	macoupin	-90.14918	39.00697	59	939	illinois	2

1342	macoupin	-90.14918	39.26480	59	940	illinois	2
1343	macoupin	-90.14918	39.35074	59	941	illinois	2
1344	macoupin	-90.16064	39.35647	59	942	illinois	2
1345	macoupin	-90.14918	39.52263	59	943	illinois	2
1346	macoupin	-89.91999	39.52263	59	944	illinois	2
1347	richland	-88.25269	38.59444	80	1371	illinois	1
1348	richland	-88.25842	38.60590	80	1372	illinois	1
1349	richland	-88.27560	38.61163	80	1373	illinois	1
1350	richland	-88.28133	38.61736	80	1374	illinois	1
1351	richland	-88.29853	38.61736	80	1375	illinois	1
1352	richland	-88.29853	38.62881	80	1376	illinois	1
1353	richland	-88.29853	38.64600	80	1377	illinois	1
1354	richland	-88.28133	38.66892	80	1378	illinois	1
1355	richland	-88.28133	38.68038	80	1379	illinois	1
1356	richland	-88.28706	38.70330	80	1380	illinois	1
1357	richland	-88.28706	38.72049	80	1381	illinois	1
1358	richland	-88.26987	38.72049	80	1382	illinois	1
1359	richland	-88.26987	38.85227	80	1383	illinois	1
1360	richland	-87.95475	38.85227	80	1384	illinois	1
1361	richland	-87.91464	38.85227	80	1385	illinois	1
1362	richland	-87.91464	38.56579	80	1386	illinois	1
1363	richland	-87.95475	38.56579	80	1387	illinois	1
1364	richland	-88.16102	38.56579	80	1388	illinois	1
1365	richland	-88.16102	38.59444	80	1389	illinois	1
1366	richland	-88.25269	38.59444	80	1390	illinois	1
1367	washington	-89.14650	38.46839	95	1670	illinois	1
1368	washington	-89.14650	38.21056	95	1671	illinois	1
1369	washington	-89.42725	38.21629	95	1672	illinois	1
1370	washington	-89.46735	38.22202	95	1673	illinois	1
1371	washington	-89.58768	38.21629	95	1674	illinois	1
1372	washington	-89.70228	38.21629	95	1675	illinois	1
1373	washington	-89.70801	38.41109	95	1676	illinois	1
1374	washington	-89.65644	38.43974	95	1677	illinois	1
1375	washington	-89.63351	38.44547	95	1678	illinois	1
1376	washington	-89.62206	38.45120	95	1679	illinois	1
1377	washington	-89.61633	38.46839	95	1680	illinois	1
1378	washington	-89.60487	38.47412	95	1681	illinois	1
1379	washington	-89.57050	38.48558	95	1682	illinois	1
1380	washington	-89.54185	38.47412	95	1683	illinois	1
1381	washington	-89.50746	38.47984	95	1684	illinois	1
1382	washington	-89.46735	38.47984	95	1685	illinois	1
1383	washington	-89.41579	38.48558	95	1686	illinois	1
1384	washington	-89.40434	38.48558	95	1687	illinois	1

1385	washington	-89.37569	38.48558	95	1688	illinois	1
1386	washington	-89.34131	38.50850	95	1689	illinois	1
1387	washington	-89.32985	38.51423	95	1690	illinois	1
1388	washington	-89.24390	38.50276	95	1691	illinois	1
1389	washington	-89.14650	38.49703	95	1692	illinois	1
1390	washington	-89.14650	38.46839	95	1693	illinois	1
1391	montgomery	-89.54185	39.52263	68	1118	illinois	2
1392	montgomery	-89.53612	39.35074	68	1119	illinois	2
1393	montgomery	-89.14077	39.35074	68	1120	illinois	2
1394	montgomery	-89.14077	39.21896	68	1121	illinois	2
1395	montgomery	-89.26109	39.21896	68	1122	illinois	2
1396	montgomery	-89.26109	39.02989	68	1123	illinois	2
1397	montgomery	-89.58768	39.02989	68	1124	illinois	2
1398	montgomery	-89.58768	39.00697	68	1125	illinois	2
1399	montgomery	-89.63924	39.00124	68	1126	illinois	2
1400	montgomery	-89.70228	39.00697	68	1127	illinois	2
1401	montgomery	-89.70228	39.36220	68	1128	illinois	2
1402	montgomery	-89.69081	39.52263	68	1129	illinois	2
1403	montgomery	-89.54185	39.52263	68	1130	illinois	2
1404	adams	-91.49563	40.21018	1	1	illinois	2
1405	adams	-90.91121	40.19299	1	2	illinois	2
1406	adams	-90.91121	40.19299	1	3	illinois	2
1407	adams	-90.91121	40.10704	1	4	illinois	2
1408	adams	-90.91121	39.83775	1	5	illinois	2
1409	adams	-90.91694	39.75754	1	6	illinois	2
1410	adams	-91.36385	39.75754	1	7	illinois	2
1411	adams	-91.38104	39.79765	1	8	illinois	2
1412	adams	-91.44979	39.85494	1	9	illinois	2
1413	adams	-91.45552	39.88359	1	10	illinois	2
1414	adams	-91.44406	39.91797	1	11	illinois	2
1415	adams	-91.42114	39.94089	1	12	illinois	2
1416	adams	-91.46698	40.00964	1	13	illinois	2
1417	adams	-91.48417	40.03829	1	14	illinois	2
1418	adams	-91.50136	40.15861	1	15	illinois	2
1419	adams	-91.49563	40.21018	1	16	illinois	2
1420	clinton	-89.70801	38.41109	14	270	illinois	2
1421	clinton	-89.70801	38.65173	14	271	illinois	2
1422	clinton	-89.59914	38.65173	14	272	illinois	2
1423	clinton	-89.59341	38.73768	14	273	illinois	2
1424	clinton	-89.27828	38.73195	14	274	illinois	2
1425	clinton	-89.14650	38.73195	14	275	illinois	2
1426	clinton	-89.14650	38.49703	14	276	illinois	2
1427	clinton	-89.24390	38.50276	14	277	illinois	2

1428	clinton	-89.32985	38.51423	14	278	illinois	2
1429	clinton	-89.34131	38.50850	14	279	illinois	2
1430	clinton	-89.37569	38.48558	14	280	illinois	2
1431	clinton	-89.40434	38.48558	14	281	illinois	2
1432	clinton	-89.41579	38.48558	14	282	illinois	2
1433	clinton	-89.46735	38.47984	14	283	illinois	2
1434	clinton	-89.50746	38.47984	14	284	illinois	2
1435	clinton	-89.54185	38.47412	14	285	illinois	2
1436	clinton	-89.57050	38.48558	14	286	illinois	2
1437	clinton	-89.60487	38.47412	14	287	illinois	2
1438	clinton	-89.61633	38.46839	14	288	illinois	2
1439	clinton	-89.62206	38.45120	14	289	illinois	2
1440	clinton	-89.63351	38.44547	14	290	illinois	2
1441	clinton	-89.65644	38.43974	14	291	illinois	2
1442	clinton	-89.70801	38.41109	14	292	illinois	2
1443	edwards	-88.15528	38.25066	24	419	illinois	1
1444	edwards	-88.16102	38.56579	24	420	illinois	1
1445	edwards	-87.95475	38.56579	24	421	illinois	1
1446	edwards	-87.94902	38.53714	24	422	illinois	1
1447	edwards	-87.94902	38.51995	24	423	illinois	1
1448	edwards	-87.95475	38.50850	24	424	illinois	1
1449	edwards	-87.94902	38.47412	24	425	illinois	1
1450	edwards	-87.94902	38.45120	24	426	illinois	1
1451	edwards	-87.94902	38.41682	24	427	illinois	1
1452	edwards	-87.96621	38.36525	24	428	illinois	1
1453	edwards	-87.95475	38.34233	24	429	illinois	1
1454	edwards	-87.94329	38.29650	24	430	illinois	1
1455	edwards	-87.94329	38.25639	24	431	illinois	1
1456	edwards	-87.97194	38.23920	24	432	illinois	1
1457	edwards	-88.02351	38.25066	24	433	illinois	1
1458	edwards	-88.15528	38.25066	24	434	illinois	1
1459	jefferson	-89.14650	38.21056	41	687	illinois	2
1460	jefferson	-89.14650	38.46839	41	688	illinois	2
1461	jefferson	-88.70533	38.46839	41	689	illinois	2
1462	jefferson	-88.70533	38.25066	41	690	illinois	2
1463	jefferson	-88.71106	38.11888	41	691	illinois	2
1464	jefferson	-89.12932	38.11888	41	692	illinois	2
1465	jefferson	-89.14650	38.12461	41	693	illinois	2
1466	jefferson	-89.14650	38.21056	41	694	illinois	2
1467	vermilion	-87.93183	40.37061	92	1623	illinois	2
1468	vermilion	-87.92610	40.47947	92	1624	illinois	2
1469	vermilion	-87.53076	40.47947	92	1625	illinois	2
1470	vermilion	-87.53076	40.47374	92	1626	illinois	2

1471	vermilion	-87.53076	40.14715	92	1627	illinois	2
1472	vermilion	-87.53649	39.86641	92	1628	illinois	2
1473	vermilion	-87.62244	39.86641	92	1629	illinois	2
1474	vermilion	-87.62817	39.87214	92	1630	illinois	2
1475	vermilion	-87.94329	39.87214	92	1631	illinois	2
1476	vermilion	-87.94329	40.22164	92	1632	illinois	2
1477	vermilion	-87.93183	40.22164	92	1633	illinois	2
1478	vermilion	-87.93183	40.37061	92	1634	illinois	2
1479	williamson	-89.04910	37.60322	100	1761	illinois	2
1480	williamson	-89.15223	37.60895	100	1762	illinois	2
1481	williamson	-89.15223	37.86105	100	1763	illinois	2
1482	williamson	-88.71106	37.86678	100	1764	illinois	2
1483	williamson	-88.71106	37.60322	100	1765	illinois	2
1484	williamson	-89.04910	37.60322	100	1766	illinois	2
1485	clark	-88.01778	39.17313	12	229	illinois	1
1486	clark	-88.01778	39.37939	12	230	illinois	1
1487	clark	-88.01778	39.48252	12	231	illinois	1
1488	clark	-87.97194	39.48252	12	232	illinois	1
1489	clark	-87.70264	39.48825	12	233	illinois	1
1490	clark	-87.69691	39.47106	12	234	illinois	1
1491	clark	-87.53649	39.47106	12	235	illinois	1
1492	clark	-87.53649	39.35647	12	236	illinois	1
1493	clark	-87.58233	39.33355	12	237	illinois	1
1494	clark	-87.61097	39.30490	12	238	illinois	1
1495	clark	-87.60525	39.28199	12	239	illinois	1
1496	clark	-87.60525	39.26480	12	240	illinois	1
1497	clark	-87.59379	39.24761	12	241	illinois	1
1498	clark	-87.59379	39.22469	12	242	illinois	1
1499	clark	-87.61097	39.19032	12	243	illinois	1
1500	clark	-87.63390	39.17313	12	244	illinois	1
1501	clark	-87.75995	39.16740	12	245	illinois	1
1502	clark	-87.75995	39.17885	12	246	illinois	1
1503	clark	-87.95475	39.17313	12	247	illinois	1
1504	clark	-88.01778	39.17313	12	248	illinois	1
1505	effingham	-88.36728	38.91529	25	436	illinois	2
1506	effingham	-88.69959	38.90956	25	437	illinois	2
1507	effingham	-88.80273	38.91529	25	438	illinois	2
1508	effingham	-88.80273	39.21896	25	439	illinois	2
1509	effingham	-88.47614	39.21323	25	440	illinois	2
1510	effingham	-88.47614	39.17313	25	441	illinois	2
1511	effingham	-88.36728	39.17313	25	442	illinois	2
1512	effingham	-88.36728	38.91529	25	443	illinois	2
1513	fulton	-90.44712	40.62271	29	492	illinois	2

1514	fulton	-90.44712	40.71438	29	493	illinois	2
1515	fulton	-89.98875	40.71438	29	494	illinois	2
1516	fulton	-89.99448	40.61698	29	495	illinois	2
1517	fulton	-89.86843	40.61698	29	496	illinois	2
1518	fulton	-89.86843	40.50812	29	497	illinois	2
1519	fulton	-89.87416	40.49093	29	498	illinois	2
1520	fulton	-89.88562	40.46228	29	499	illinois	2
1521	fulton	-89.91427	40.42790	29	500	illinois	2
1522	fulton	-89.96583	40.41071	29	501	illinois	2
1523	fulton	-90.02313	40.37634	29	502	illinois	2
1524	fulton	-90.05177	40.34769	29	503	illinois	2
1525	fulton	-90.08042	40.27893	29	504	illinois	2
1526	fulton	-90.10334	40.26747	29	505	illinois	2
1527	fulton	-90.13199	40.22164	29	506	illinois	2
1528	fulton	-90.18356	40.20445	29	507	illinois	2
1529	fulton	-90.20075	40.18726	29	508	illinois	2
1530	fulton	-90.45284	40.18726	29	509	illinois	2
1531	fulton	-90.45284	40.27320	29	510	illinois	2
1532	fulton	-90.44712	40.62271	29	511	illinois	2
1533	hamilton	-88.38447	38.25066	33	566	illinois	1
1534	hamilton	-88.37874	37.90689	33	567	illinois	1
1535	hamilton	-88.70533	37.90689	33	568	illinois	1
1536	hamilton	-88.71106	38.11888	33	569	illinois	1
1537	hamilton	-88.70533	38.25066	33	570	illinois	1
1538	hamilton	-88.38447	38.25066	33	571	illinois	1
1539	henry	-90.17210	41.58527	37	625	illinois	2
1540	henry	-89.85124	41.59101	37	626	illinois	2
1541	henry	-89.85124	41.48214	37	627	illinois	2
1542	henry	-89.83405	41.48214	37	628	illinois	2
1543	henry	-89.83405	41.24150	37	629	illinois	2
1544	henry	-89.85697	41.24150	37	630	illinois	2
1545	henry	-89.85697	41.14410	37	631	illinois	2
1546	henry	-89.98875	41.14410	37	632	illinois	2
1547	henry	-90.44139	41.14410	37	633	illinois	2
1548	henry	-90.43566	41.32745	37	634	illinois	2
1549	henry	-90.42993	41.46495	37	635	illinois	2
1550	henry	-90.37836	41.48214	37	636	illinois	2
1551	henry	-90.36691	41.49934	37	637	illinois	2
1552	henry	-90.29242	41.51652	37	638	illinois	2
1553	henry	-90.24658	41.52225	37	639	illinois	2
1554	henry	-90.21793	41.53371	37	640	illinois	2
1555	henry	-90.18356	41.55090	37	641	illinois	2
1556	henry	-90.17210	41.58527	37	642	illinois	2

1557	johnson	-89.04910	37.60322	44	737 illinois	1
1558	johnson	-88.71106	37.60322	44	738 illinois	1
1559	johnson	-88.71106	37.34539	44	739 illinois	1
1560	johnson	-88.94024	37.34539	44	740 illinois	1
1561	johnson	-88.91732	37.32820	44	741 illinois	1
1562	johnson	-88.91732	37.31674	44	742 illinois	1
1563	johnson	-88.92878	37.31101	44	743 illinois	1
1564	johnson	-88.94597	37.30528	44	744 illinois	1
1565	johnson	-88.96316	37.31101	44	745 illinois	1
1566	johnson	-88.98035	37.31674	44	746 illinois	1
1567	johnson	-88.99754	37.32820	44	747 illinois	1
1568	johnson	-89.02618	37.32247	44	748 illinois	1
1569	johnson	-89.04910	37.31674	44	749 illinois	1
1570	johnson	-89.04910	37.33393	44	750 illinois	1
1571	johnson	-89.04910	37.60322	44	751 illinois	1
1572	lake	-87.77141	42.15824	49	790 illinois	6
1573	lake	-88.20686	42.15824	49	791 illinois	6
1574	lake	-88.20112	42.50774	49	792 illinois	6
1575	lake	-87.80006	42.50201	49	793 illinois	6
1576	lake	-87.80006	42.47336	49	794 illinois	6
1577	lake	-87.80006	42.43325	49	795 illinois	6
1578	lake	-87.81152	42.37023	49	796 illinois	6
1579	lake	-87.82870	42.32439	49	797 illinois	6
1580	lake	-87.82870	42.27856	49	798 illinois	6
1581	lake	-87.81724	42.23272	49	799 illinois	6
1582	lake	-87.78859	42.19261	49	800 illinois	6
1583	lake	-87.77141	42.15824	49	801 illinois	6
1584	livingston	-88.93451	40.74876	53	848 illinois	2
1585	livingston	-88.92878	40.92637	53	849 illinois	2
1586	livingston	-88.92878	41.10399	53	850 illinois	2
1587	livingston	-88.59074	41.10399	53	851 illinois	2
1588	livingston	-88.24696	41.10972	53	852 illinois	2
1589	livingston	-88.24696	41.00086	53	853 illinois	2
1590	livingston	-88.24696	40.61125	53	854 illinois	2
1591	livingston	-88.46468	40.60552	53	855 illinois	2
1592	livingston	-88.57928	40.60552	53	856 illinois	2
1593	livingston	-88.57928	40.65136	53	857 illinois	2
1594	livingston	-88.59074	40.65136	53	858 illinois	2
1595	livingston	-88.59074	40.74876	53	859 illinois	2
1596	livingston	-88.93451	40.74876	53	860 illinois	2
1597	scott	-90.60755	39.78619	86	1524 illinois	1
1598	scott	-90.48723	39.78619	86	1525 illinois	1
1599	scott	-90.48723	39.75181	86	1526 illinois	1

1600	scott	-90.37263	39.74608	86	1527	illinois	1
1601	scott	-90.37263	39.66587	86	1528	illinois	1
1602	scott	-90.33253	39.66014	86	1529	illinois	1
1603	scott	-90.33253	39.63149	86	1530	illinois	1
1604	scott	-90.29815	39.63149	86	1531	illinois	1
1605	scott	-90.30388	39.52263	86	1532	illinois	1
1606	scott	-90.58463	39.52263	86	1533	illinois	1
1607	scott	-90.58463	39.55701	86	1534	illinois	1
1608	scott	-90.65339	39.67160	86	1535	illinois	1
1609	scott	-90.65339	39.70024	86	1536	illinois	1
1610	scott	-90.64192	39.73462	86	1537	illinois	1
1611	scott	-90.60755	39.78619	86	1538	illinois	1
1612	cass	-90.51014	39.98672	9	162	illinois	1
1613	cass	-90.49295	39.99818	9	163	illinois	1
1614	cass	-90.44712	40.02110	9	164	illinois	1
1615	cass	-90.42993	40.04402	9	165	illinois	1
1616	cass	-90.41273	40.07267	9	166	illinois	1
1617	cass	-90.38409	40.08986	9	167	illinois	1
1618	cass	-90.37836	40.10704	9	168	illinois	1
1619	cass	-90.36118	40.11851	9	169	illinois	1
1620	cass	-90.32680	40.10704	9	170	illinois	1
1621	cass	-90.30388	40.08413	9	171	illinois	1
1622	cass	-90.29815	40.06121	9	172	illinois	1
1623	cass	-90.28669	40.04975	9	173	illinois	1
1624	cass	-90.26377	40.06121	9	174	illinois	1
1625	cass	-90.22366	40.04975	9	175	illinois	1
1626	cass	-90.19501	40.06694	9	176	illinois	1
1627	cass	-90.17210	40.06121	9	177	illinois	1
1628	cass	-90.13199	40.07267	9	178	illinois	1
1629	cass	-90.10908	40.07840	9	179	illinois	1
1630	cass	-90.07470	40.08986	9	180	illinois	1
1631	cass	-90.03459	40.10131	9	181	illinois	1
1632	cass	-90.02313	40.10131	9	182	illinois	1
1633	cass	-89.98875	40.12423	9	183	illinois	1
1634	cass	-89.98875	39.90078	9	184	illinois	1
1635	cass	-89.99448	39.86641	9	185	illinois	1
1636	cass	-90.58463	39.86641	9	186	illinois	1
1637	cass	-90.58463	39.88359	9	187	illinois	1
1638	cass	-90.54452	39.92943	9	188	illinois	1
1639	cass	-90.52734	39.96381	9	189	illinois	1
1640	cass	-90.51014	39.98672	9	190	illinois	1
1641	warren	-90.44139	41.06388	94	1663	illinois	1
1642	warren	-90.44712	40.71438	94	1664	illinois	1

```

1643      warren -90.44712 40.62271    94 1665 illinois    1
1644      warren -90.79662 40.62271    94 1666 illinois    1
1645      warren -90.79662 41.06388    94 1667 illinois    1
1646      warren -90.44139 41.06388    94 1668 illinois    1

```

```

register_stadiamaps('d79ae55c-4f24-4156-84b2-c2fbbb1407fb')
# Define the bounding box for the area of interest
bbox <- c(left = -92, bottom = 36.5, right = -87, top = 43)

# Fetch the base map
map <- get_stadiamap(bbox = bbox, zoom = 7, maptype = "stamen_toner_lite")

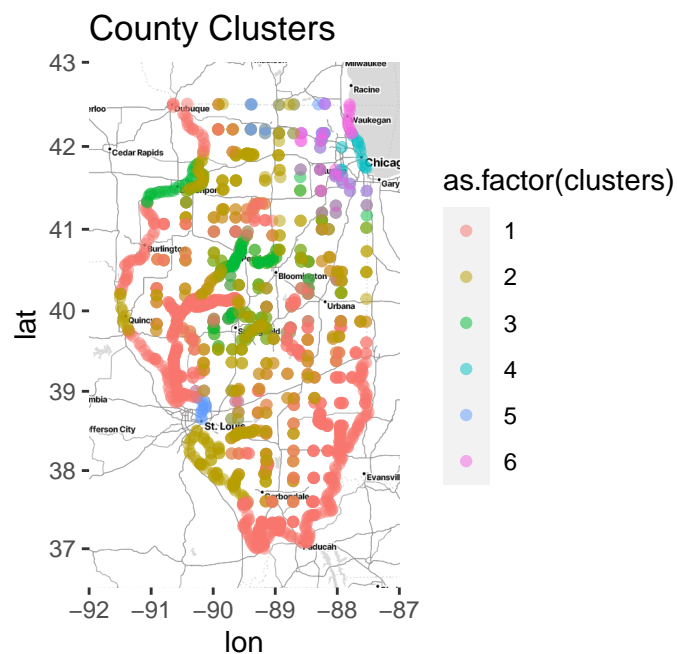
```

i © Stadia Maps © Stamen Design © OpenMapTiles © OpenStreetMap contributors.

```

ggmap(map) +
  geom_point(data = acs_map, aes(x = long, y = lat, color = as.factor(clusters)), alpha =
  labs(title = "County Clusters")

```



Census Tracts

For the next section we need ACS data on a census tract level. We use the same variables as before.

```
acs_il_t <- getCensus(name = "acs/acs5",
                     vintage = 2016,
                     vars = c("NAME", "B01003_001E", "B19013_001E", "B19301_001E"),
                     region = "tract:*",
                     regionin = "state:17",
                     key = '457e74535811f68ac33753e2d9107cb373e935d4') %>%
  mutate_all(list(~ifelse(.== -666666666, NA, .))) %>%
  rename(pop = B01003_001E,
         hh_income = B19013_001E,
         income = B19301_001E)

head(acs_il_t)
```

	state	county	tract	NAME	pop
1	17	031	806002	Census Tract 8060.02, Cook County, Illinois	7304
2	17	031	806003	Census Tract 8060.03, Cook County, Illinois	7577
3	17	031	806400	Census Tract 8064, Cook County, Illinois	2684
4	17	031	806501	Census Tract 8065.01, Cook County, Illinois	2590
5	17	031	750600	Census Tract 7506, Cook County, Illinois	3594
6	17	031	310200	Census Tract 3102, Cook County, Illinois	1521

	hh_income	income
1	56975	23750
2	53769	25016
3	62750	30154
4	53583	20282
5	40125	18347
6	63250	31403

k-Means

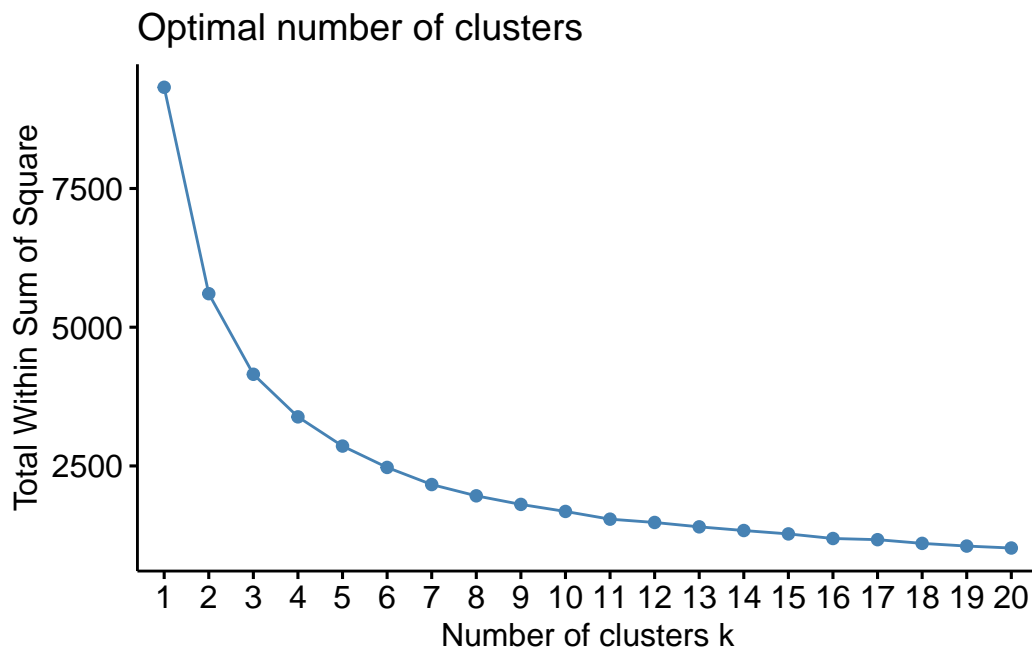
As before, clean our data for clustering census tracts based on population, average household income and per capita income.

```
acs_il_t$pop <- as.numeric(acs_il_t$pop)
acs_il_t$hh_income <- as.numeric(acs_il_t$hh_income)
acs_il_t$income <- as.numeric(acs_il_t$income)
```

```
acs_il_t <- na.omit(acs_il_t)
```

Since we want to use K Means in this section, we start by determining the optimal number of K that results in Clusters with low within but high between variation. Plot within cluster sums of squares for a range of K (e.g. up to 20).

```
hclust_data2 <-  
  acs_il_t %>%  
  select(pop, hh_income, income) %>%  
  mutate_all(scale)  
  
fviz_nbclust(hclust_data2,  
             kmeans,  
             method = "wss",  
             k.max = 20)
```



Run `kmeans()` for the optimal number of clusters based on the plot above.

```
set.seed(123)  
km_1 <- kmeans(hclust_data2, 6, nstart = 25)  
km_1
```

K-means clustering with 6 clusters of sizes 527, 154, 690, 764, 914, 60

Cluster means:

	pop	hh_income	income
1	0.1981152	1.0686452	0.91096067
2	-0.1621974	2.5027520	2.92927259
3	0.9361393	-0.2454763	-0.35947856
4	-0.7350496	-0.9786683	-0.84454539
5	-0.4206269	-0.1061549	-0.07767296
6	3.6777750	1.0917832	0.55136196

Clustering vector:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
3	3	5	5	4	5	4	5	4	4	5	5	2	2	2	2
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	5	1	1	3	1	5	4	5	5	3	5	4	5	4	5
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
4	4	4	1	5	3	3	5	1	3	3	5	5	1	5	1
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
1	1	3	5	1	5	3	3	5	4	5	4	4	4	4	4
65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
6	1	4	4	4	5	5	5	5	4	4	4	4	4	4	1
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
4	4	1	1	5	2	1	1	5	1	2	2	2	2	2	2
97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112
3	5	4	5	3	1	2	2	1	1	6	2	6	6	6	1
113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128
3	1	5	1	3	6	1	3	1	1	2	1	1	1	3	5
129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
5	1	4	3	4	3	4	4	4	4	1	4	4	4	3	3
145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
1	4	3	3	5	3	5	3	4	4	5	3	4	4	3	4
161	162	163	164	165	166	167	168	169	170	171	172	173	175	176	177
4	4	4	5	4	5	5	4	4	1	5	6	4	4	4	4
178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193
5	5	5	5	3	5	5	4	4	3	5	4	4	4	4	5
194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209
5	3	3	4	5	4	4	3	3	3	3	3	4	5	4	3
210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
1	3	5	5	1	3	3	5	4	5	4	4	4	4	1	4
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241
1	5	4	3	3	4	5	3	4	4	4	4	4	4	4	3
242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257

5	3	3	5	4	3	4	3	5	5	4	1	5	4	3	5
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273
4	3	4	4	5	5	5	5	1	1	3	1	3	5	2	5
274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289
2	5	5	1	5	1	5	5	1	2	5	5	5	5	1	1
290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305
1	1	1	2	1	1	1	5	5	4	3	3	3	5	3	5
306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321
5	3	5	5	5	5	5	5	3	5	4	5	3	3	3	1
322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337
1	5	3	1	2	5	1	1	5	3	3	3	5	1	5	4
338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353
5	3	1	1	6	2	2	2	1	4	4	5	1	3	3	3
354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369
1	1	3	4	4	1	3	1	5	3	4	5	5	5	5	5
370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385
5	5	5	3	4	4	4	4	4	3	5	4	5	4	5	4
386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401
3	4	3	5	3	5	4	5	4	5	5	3	3	2	4	1
402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417
1	3	4	5	5	4	4	3	5	5	5	1	1	4	4	4
418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433
1	4	1	1	1	1	3	5	4	1	1	5	4	5	4	1
434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449
1	4	3	4	4	5	5	5	5	4	4	4	4	5	3	5
450	451	452	453	454	455	456	457	458	459	460	461	462	464	465	466
4	5	5	4	5	5	3	2	1	2	2	2	2	2	3	4
467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482
5	3	4	5	2	3	3	3	3	5	1	3	4	3	3	3
483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498
4	5	2	3	3	5	3	5	3	1	3	5	5	5	5	1
499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514
5	1	1	1	1	1	1	1	1	1	1	5	1	5	1	5
515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530
1	1	1	5	5	5	3	1	1	3	4	4	1	1	6	6
531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546
3	2	5	2	3	4	4	5	3	3	4	4	4	4	4	1
547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562
1	5	2	1	1	2	1	1	2	4	5	3	3	3	5	5
563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578
5	1	5	5	1	5	1	1	1	3	3	5	5	3	5	2
579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594
2	1	2	1	2	2	1	1	1	1	2	2	5	5	5	3

595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610
4	5	4	4	2	1	4	1	1	4	1	3	5	3	5	5
611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626
4	4	3	3	1	5	3	3	4	4	4	5	5	5	4	4
627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642
4	4	4	4	3	4	4	1	4	4	4	4	5	3	5	5
643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658
5	4	4	5	3	4	4	4	3	1	4	4	4	4	5	5
659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674
2	3	2	4	5	3	4	5	4	5	4	3	5	3	5	5
675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690
5	4	4	4	1	4	3	5	4	4	3	4	6	1	6	4
691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706
1	2	1	5	1	2	1	1	1	1	5	5	3	5	1	3
707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722
1	5	3	5	1	1	1	1	2	1	5	3	3	3	5	3
723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738
1	4	1	4	5	5	5	5	5	5	5	5	5	5	5	5
739	741	742	743	744	746	747	748	749	750	751	752	753	754	755	756
5	5	3	5	3	5	3	3	3	3	5	1	5	4	3	4
757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772
4	3	3	4	5	3	3	1	1	1	4	3	5	5	3	2
773	774	775	776	777	778	779	780	782	783	784	785	786	787	788	789
5	5	5	5	4	4	5	4	5	4	4	5	4	4	5	4
790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805
5	1	4	4	5	5	4	1	1	2	2	2	1	2	2	1
806	807	808	809	810	811	812	813	815	816	817	818	819	820	821	822
1	1	5	1	4	2	1	3	5	3	5	3	4	5	3	5
823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838
4	1	2	3	5	5	4	4	5	5	4	5	3	4	5	5
839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854
5	5	5	5	5	5	5	5	5	5	3	5	5	5	5	3
855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870
5	5	5	4	4	4	4	5	5	4	5	3	1	6	6	1
871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886
5	3	2	5	3	5	1	2	2	5	3	3	5	1	5	4
887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902
4	5	1	2	1	1	1	5	3	1	1	1	1	1	5	3
903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918
3	1	1	3	5	6	3	3	6	4	3	6	6	5	5	4
919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934
4	5	5	4	3	4	5	5	5	3	4	4	4	5	5	1
935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950

3	1	3	3	4	4	5	4	5	4	4	5	3	3	3	5
951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966
5	5	5	4	3	1	4	5	4	3	5	5	5	1	1	1
967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982
1	1	1	1	1	4	4	4	5	5	4	5	5	4	5	4
983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998
4	4	5	5	5	3	1	1	5	6	1	1	5	1	1	3
999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014
5	4	4	4	4	4	1	5	3	2	2	4	4	3	3	4
1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030
4	4	4	4	4	3	4	1	5	5	3	2	1	3	5	3
1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046
2	2	1	1	5	1	3	5	5	5	2	2	3	1	5	5
1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062
5	3	4	3	4	3	3	3	4	5	4	3	5	5	5	3
1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078
5	5	4	4	4	3	4	3	5	1	5	1	1	1	5	5
1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094
5	5	5	3	5	5	5	4	2	6	1	6	5	1	3	5
1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110
1	3	5	3	3	5	5	1	2	3	3	3	5	3	5	5
1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126
5	5	3	3	5	4	4	4	4	5	4	3	4	5	3	4
1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142
5	5	5	5	4	3	4	4	4	3	3	3	3	5	5	4
1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158
3	5	3	3	4	3	3	3	4	3	5	4	4	4	5	1
1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174
2	1	3	3	5	3	1	4	4	4	4	4	4	5	4	4
1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190
4	4	5	3	5	3	3	4	4	4	4	4	5	1	1	5
1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206
4	5	4	3	4	3	2	5	3	3	3	4	4	3	1	5
1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222
3	5	1	1	5	3	1	2	1	1	1	1	1	1	1	1
1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238
5	1	1	1	1	1	1	1	1	1	5	5	4	4	6	3
1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254
3	5	3	2	6	1	1	3	1	5	3	6	1	5	4	2
1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270
2	3	1	5	3	2	3	4	6	1	5	2	5	5	1	3
1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286
2	2	5	5	5	3	5	2	3	4	3	3	4	3	1	1

1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302
5	1	1	5	3	3	5	4	3	4	1	1	4	3	4	5
1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318
3	3	3	4	4	3	3	3	5	4	3	3	3	4	3	4
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3	5	5	5	4	2	1	2	2	1	4	4	4	5	3	5
2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925
1	4	5	4	5	5	3	4	3	4	4	5	1	4	4	2
2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941
3	5	3	5	1	2	5	2	2	2	2	2	2	2	2	5
2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957
5	5	3	5	4	5	4	3	5	5	5	5	5	4	5	5
2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973
5	5	3	1	5	3	3	5	1	3	5	5	3	3	3	3
2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989
3	3	4	4	4	1	4	1	6	1	1	1	3	1	1	1
2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000	3001	3002	3003	3004	3005
1	4	1	3	3	1	5	4	4	4	4	4	3	3	4	4
3006	3008	3009	3010	3011	3012	3013	3014	3015	3016	3017	3018	3019	3020	3021	3022

```

    4    5    4    5    3    5    1    4    3    5    3    4    4    4    5    5
3023 3024 3025 3026 3027 3028 3029 3030 3031 3032 3033 3034 3035 3036 3037 3038
    5    1    4    4    4    4    4    5    3    1    4    3    3    1    5    1
3039 3040 3041 3042 3043 3044 3045 3046 3047 3048 3049 3050 3051 3052 3053 3054
    4    4    4    4    3    3    3    3    1    3    4    1    3    3    1    3
3055 3056 3057 3058 3059 3060 3061 3062 3063 3064 3065 3066 3067 3068 3069 3070
    3    3    5    5    3    5    1    5    5    1    5    3    5    5    4    5
3071 3072 3073 3074 3075 3076 3077 3078 3079 3080 3081 3082 3083 3084 3085 3086
    4    5    5    5    3    3    5    4    5    5    5    5    5    3    3    1
3087 3088 3089 3090 3091 3092 3093 3094 3095 3096 3097 3098 3099 3100 3101 3102
    1    5    5    5    5    3    3    3    3    3    1    5    3    3    3    3
3103 3104 3105 3106 3107 3108 3109 3110 3111 3112 3113 3114 3115 3116 3117 3118
    5    4    3    3    3    4    4    5    3    1    3    2    3    5    1    5
3119 3120 3121 3122 3123
    3    5    4    5    4

```

Within cluster sum of squares by cluster:

```

[1] 559.7110 447.2754 472.1113 327.3738 393.5146 270.3285
(between_SS / total_SS = 73.5 %)

```

Available components:

```

[1] "cluster"      "centers"      "totss"        "withinss"     "tot.withinss"
[6] "betweenss"    "size"         "iter"         "ifault"

```

```

acs_il_t$cluster <- km_1$cluster

```

Find the mean population, household income and per capita income grouped by clusters. In addition, display the most frequent county that can be observed within each cluster.

```

acs_il_t <- acs_il_t %>%
  mutate(county_name = sapply(strsplit(NAME, ", "), `\[`, 2))

summary_cluster <- acs_il_t %>%
  group_by(cluster) %>%
  summarize(
    mean_pop = mean(pop),
    mean_hh_income = mean(hh_income),
    mean_income = mean(income),
    most_frequent_county = names(sort(table(county_name), decreasing = TRUE)[1])
  )
summary_cluster

```



```
# A tibble: 6 x 5
  cluster mean_pop mean_hh_income mean_income most_frequent_county
  <int>     <dbl>         <dbl>         <dbl> <chr>
1     1     4519.         92963.         45055. Cook County
2     2     3812.        135623.         77010. Cook County
3     3     5965.         53872.         24940. Cook County
4     4     2689.         32061.         17260. Cook County
5     5     3306.         58016.         29402. Cook County
6     6    11340.         93651.         39361. Will County
```

As you might have seen earlier, it's not always clear which number of clusters is the optimal choice. To automate K Means clustering, program a function based on `kmeans()` that takes K as an argument. You can fix the other arguments, e.g. such that a specific dataset is always used when calling the function.

```
km_func <- function(K) {
  set.seed(123)
  km <- kmeans(hclust_data2, centers = K, nstart = 20)
  return(km)
}
```

We want to utilize this function to iterate over multiple Ks (e.g., K = 2, ..., 10) and -- each time -- add the resulting cluster membership as a new variable to our (cleaned) original data frame (`acs_il_t`). There are multiple solutions for this task, e.g. think about the `apply` family or `for` loops.

```
cluster_list <- list()
for (K in 2:10) {
  km_result <- km_func(K)
  cluster_col_name <- paste("cluster ", K, sep = "")
  acs_il_t[cluster_col_name] <- km_result$cluster
  cluster_list[[K]] <- km_result
}
```

Finally, display the first rows of the updated data set (with multiple cluster columns).

```
head(acs_il_t)
```

```
state county tract NAME pop
1 17 031 806002 Census Tract 8060.02, Cook County, Illinois 7304
2 17 031 806003 Census Tract 8060.03, Cook County, Illinois 7577
3 17 031 806400 Census Tract 8064, Cook County, Illinois 2684
```

4	17	031 806501	Census Tract 8065.01, Cook County, Illinois				2590	
5	17	031 750600	Census Tract 7506, Cook County, Illinois				3594	
6	17	031 310200	Census Tract 3102, Cook County, Illinois				1521	
	hh_income	income	cluster	county_name	cluster 2	cluster 3	cluster 4	cluster 5
1	56975	23750	3	Cook County	2	3	4	4
2	53769	25016	3	Cook County	2	3	4	4
3	62750	30154	5	Cook County	2	2	1	5
4	53583	20282	5	Cook County	2	2	2	2
5	40125	18347	4	Cook County	2	2	2	2
6	63250	31403	5	Cook County	2	2	1	5
	cluster 6	cluster 7	cluster 8	cluster 9	cluster 10			
1	3	6	3	7	8			
2	3	6	3	7	8			
3	5	3	2	6	7			
4	5	2	2	6	7			
5	4	2	6	4	10			
6	5	3	2	6	7			