

Stats 506, F18, Problem Set 1

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Question 1

Part A

```
##      2010
##      2010
```

Part B

```
## 1
##      794
## 2
##      1327
## 3
##      2010
## 4
##      1555
```

Question 2

Question 2 a.

Which airlines were responsible for at least 1% of the flights

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##      filter, lag

## The following objects are masked from 'package:base':
##
##      intersect, setdiff, setequal, union
```

Proprtion of Flights by Airlines Over 1%.

| airline | pecent(%) |
|--------------------------|-----------|
| United Air Lines Inc. | 17.37 |
| JetBlue Airways | 16.21 |
| ExpressJet Airlines Inc. | 16.13 |

| | |
|-----------------------------|-------|
| Delta Air Lines Inc. | 14.28 |
| American Airlines Inc. | 9.75 |
| Envoy Air | 7.89 |
| US Airways Inc. | 6.12 |
| Endeavor Air Inc. | 5.41 |
| Southwest Airlines Co. | 3.60 |
| Virgin America | 1.51 |
| AirTran Airways Corporation | 1.01 |

Question 2 b.

number and percent of annual flights in the first 10 months of 2013 and the first 10 months of 2014:

Number and Percent of Annual Flights (%) in First 10 Months, 2013.

| Airline | Number | Pecent(%) | Lower bound(%) | Upper bound(%) |
|-----------------------------|--------|-----------|----------------|----------------|
| AirTran Airways Corporation | 2845 | 1.02 | 0.98 | 1.06 |
| American Airlines Inc. | 27447 | 9.82 | 9.71 | 9.93 |
| Delta Air Lines Inc. | 40168 | 14.38 | 14.25 | 14.51 |
| Endeavor Air Inc. | 15232 | 5.45 | 5.37 | 5.54 |
| Envoy Air | 22202 | 7.95 | 7.85 | 8.05 |
| ExpressJet Airlines Inc. | 45395 | 16.25 | 16.11 | 16.39 |
| JetBlue Airways | 45605 | 16.32 | 16.19 | 16.46 |
| Southwest Airlines Co. | 10143 | 3.63 | 3.56 | 3.70 |
| US Airways Inc. | 17232 | 6.17 | 6.08 | 6.26 |
| United Air Lines Inc. | 48880 | 17.50 | 17.35 | 17.64 |
| Virgin America | 4235 | 1.52 | 1.47 | 1.56 |

Number and Percent of Annual Flights (%) in First 10 Months, 2014.

| Airline | Number | Pecent(%) | Lower bound(%) | Upper bound(%) |
|-----------------------------|--------|-----------|----------------|----------------|
| AirTran Airways Corporation | 1251 | 0.50 | 0.47 | 0.52 |
| American Airlines Inc. | 26302 | 10.45 | 10.33 | 10.56 |
| Delta Air Lines Inc. | 41683 | 16.55 | 16.41 | 16.70 |
| Endeavor Air Inc. | 0 | 0.00 | 0.00 | 0.00 |
| Envoy Air | 18559 | 7.37 | 7.27 | 7.47 |
| ExpressJet Airlines Inc. | 39819 | 15.81 | 15.67 | 15.96 |

| | | | | |
|------------------------|-------|-------|-------|-------|
| JetBlue Airways | 44479 | 17.66 | 17.51 | 17.81 |
| Southwest Airlines Co. | 11902 | 4.73 | 4.64 | 4.81 |
| US Airways Inc. | 16750 | 6.65 | 6.55 | 6.75 |
| United Air Lines Inc. | 46267 | 18.37 | 18.22 | 18.53 |
| Virgin America | 4797 | 1.91 | 1.85 | 1.96 |

Percent Change of Annual Flights (%) in First 10 Months, 2013-2014.

| Airline | Percent Change(%) | Lower bound(%) | Upper bound(%) |
|-----------------------------|-------------------|----------------|----------------|
| AirTran Airways Corporation | -0.52 | -0.52 | -0.52 |
| American Airlines Inc. | 0.62 | 0.62 | 0.62 |
| Delta Air Lines Inc. | 2.18 | 2.17 | 2.18 |
| Endeavor Air Inc. | -5.45 | -5.45 | -5.45 |
| Envoy Air | -0.58 | -0.58 | -0.58 |
| ExpressJet Airlines Inc. | -0.44 | -0.44 | -0.43 |
| JetBlue Airways | 1.34 | 1.34 | 1.34 |
| Southwest Airlines Co. | 1.10 | 1.10 | 1.10 |
| US Airways Inc. | 0.48 | 0.48 | 0.49 |
| United Air Lines Inc. | 0.88 | 0.88 | 0.88 |
| Virgin America | 0.39 | 0.39 | 0.39 |

Which airlines showed the largest increase and decrease?

largest increase: Delta Air Lines Inc. largest decrease: Endeavor Air Inc.

Why do some airlines show an increase in the percent of flights but a decrease in the number of flights?

It is due to change in the total yearly amount of flights. As total number of flights in 2014 declined from 279384 to 251809, percent would rise with drop in number for airlines.

Question 2 c.

Among of the three NYC airports

Proprtion of Flights (%) by Airlines at Each NYC Airports.

| Airport | Airline | Percent(%) |
|---------|--------------------------|------------|
| EWR | United Air Lines Inc. | 39.48 |
| EWR | ExpressJet Airlines Inc. | 34.70 |
| EWR | JetBlue Airways | 5.78 |

| | | |
|-----|-----------------------------|-------|
| EWR | Southwest Airlines Co. | 5.28 |
| EWR | Delta Air Lines Inc. | 4.08 |
| EWR | US Airways Inc. | 3.79 |
| EWR | American Airlines Inc. | 2.95 |
| EWR | Virgin America | 1.54 |
| EWR | Envoy Air | 1.17 |
| EWR | Alaska Airlines Inc. | 0.62 |
| EWR | Endeavor Air Inc. | 0.61 |
| EWR | SkyWest Airlines Inc. | 0.00 |
| JFK | JetBlue Airways | 39.58 |
| JFK | Delta Air Lines Inc. | 20.52 |
| JFK | American Airlines Inc. | 13.34 |
| JFK | Endeavor Air Inc. | 7.60 |
| JFK | Envoy Air | 6.56 |
| JFK | United Air Lines Inc. | 4.39 |
| JFK | Virgin America | 3.49 |
| JFK | US Airways Inc. | 2.93 |
| JFK | ExpressJet Airlines Inc. | 1.29 |
| JFK | Hawaiian Airlines Inc. | 0.31 |
| LGA | Delta Air Lines Inc. | 22.07 |
| LGA | Envoy Air | 15.80 |
| LGA | American Airlines Inc. | 14.38 |
| LGA | US Airways Inc. | 12.57 |
| LGA | ExpressJet Airlines Inc. | 10.18 |
| LGA | United Air Lines Inc. | 7.54 |
| LGA | Southwest Airlines Co. | 6.97 |
| LGA | JetBlue Airways | 5.71 |
| LGA | AirTran Airways Corporation | 2.39 |
| LGA | Endeavor Air Inc. | 1.34 |
| LGA | Frontier Airlines Inc. | 0.61 |
| LGA | Mesa Airlines Inc. | 0.32 |
| LGA | SkyWest Airlines Inc. | 0.12 |
| LGA | Virgin America | 0.01 |

Proportion of Flights (%) by Airlines in Part A.

| Airport | Airline | Percent(%) | Lower bound(%) | Upper bound(%) |
|---------|---------|------------|----------------|----------------|
|---------|---------|------------|----------------|----------------|

| | | | | |
|-----|-----------------------------|-------|-------|-------|
| EWR | United Air Lines Inc. | 39.48 | 39.27 | 39.69 |
| EWR | ExpressJet Airlines Inc. | 34.70 | 34.50 | 34.91 |
| EWR | JetBlue Airways | 5.78 | 5.68 | 5.88 |
| EWR | Southwest Airlines Co. | 5.28 | 5.18 | 5.38 |
| EWR | Delta Air Lines Inc. | 4.08 | 3.99 | 4.16 |
| EWR | US Airways Inc. | 3.79 | 3.70 | 3.87 |
| EWR | American Airlines Inc. | 2.95 | 2.87 | 3.02 |
| EWR | Virgin America | 1.54 | 1.49 | 1.59 |
| EWR | Envoy Air | 1.17 | 1.13 | 1.22 |
| EWR | Endeavor Air Inc. | 0.61 | 0.58 | 0.64 |
| JFK | JetBlue Airways | 39.58 | 39.36 | 39.80 |
| JFK | Delta Air Lines Inc. | 20.52 | 20.34 | 20.70 |
| JFK | American Airlines Inc. | 13.34 | 13.18 | 13.49 |
| JFK | Endeavor Air Inc. | 7.60 | 7.48 | 7.72 |
| JFK | Envoy Air | 6.56 | 6.45 | 6.67 |
| JFK | United Air Lines Inc. | 4.39 | 4.30 | 4.48 |
| JFK | Virgin America | 3.49 | 3.41 | 3.58 |
| JFK | US Airways Inc. | 2.93 | 2.85 | 3.00 |
| JFK | ExpressJet Airlines Inc. | 1.29 | 1.23 | 1.34 |
| LGA | Delta Air Lines Inc. | 22.07 | 21.89 | 22.26 |
| LGA | Envoy Air | 15.80 | 15.64 | 15.96 |
| LGA | American Airlines Inc. | 14.38 | 14.22 | 14.54 |
| LGA | US Airways Inc. | 12.57 | 12.42 | 12.72 |
| LGA | ExpressJet Airlines Inc. | 10.18 | 10.04 | 10.32 |
| LGA | United Air Lines Inc. | 7.54 | 7.42 | 7.66 |
| LGA | Southwest Airlines Co. | 6.97 | 6.86 | 7.09 |
| LGA | JetBlue Airways | 5.71 | 5.60 | 5.81 |
| LGA | AirTran Airways Corporation | 2.39 | 2.32 | 2.45 |
| LGA | Endeavor Air Inc. | 1.34 | 1.29 | 1.40 |
| LGA | Virgin America | 0.01 | 0.00 | 0.01 |

Which airline is the largest carrier at each airport?

Largest Carrier at Each Airport.

| Airport | Airline | Percent(%) |
|---------|-----------------------|------------|
| EWR | United Air Lines Inc. | 39.48 |

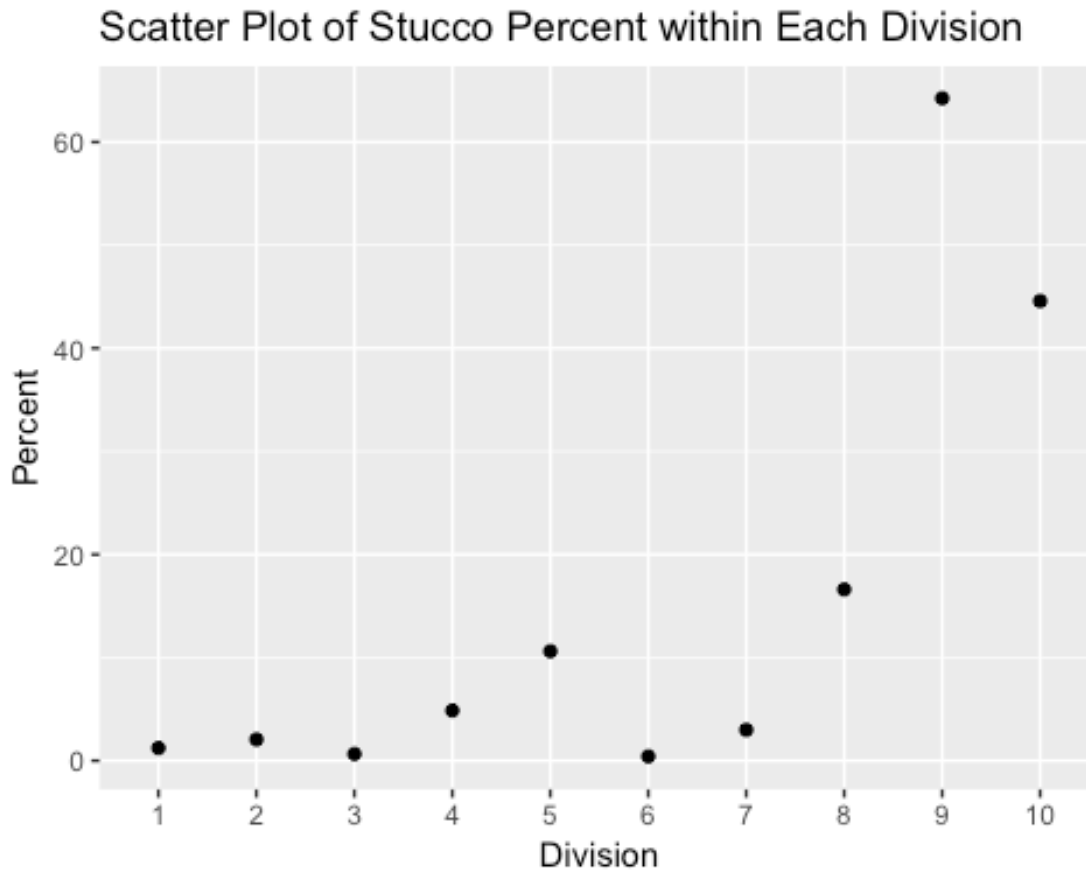
| | | |
|-----|----------------------|-------|
| JFK | JetBlue Airways | 39.58 |
| LGA | Delta Air Lines Inc. | 22.07 |

Question3

Question 3 a

Percent of Homes in Stucco Construction within Each Division.

| Division | Pecent(%) | Std_error | Lower bound(%) | Upper bound(%) |
|----------|-----------|-----------|----------------|----------------|
| 1 | 1.23 | 0.57 | 0.11 | 2.34 |
| 2 | 2.06 | 0.52 | 1.04 | 3.08 |
| 3 | 0.66 | 0.20 | 0.27 | 1.05 |
| 4 | 4.87 | 1.43 | 2.07 | 7.66 |
| 5 | 10.62 | 0.99 | 8.67 | 12.57 |
| 6 | 0.42 | 0.29 | -0.15 | 0.99 |
| 7 | 2.99 | 0.50 | 2.01 | 3.96 |
| 8 | 16.61 | 2.28 | 12.14 | 21.07 |
| 9 | 64.25 | 3.17 | 58.04 | 70.45 |
| 10 | 44.59 | 1.19 | 42.24 | 46.93 |



Which division has the highest proportion? Which the lowest?

highest proportion: division 9, lowest proportion: division 6

Question 3 b

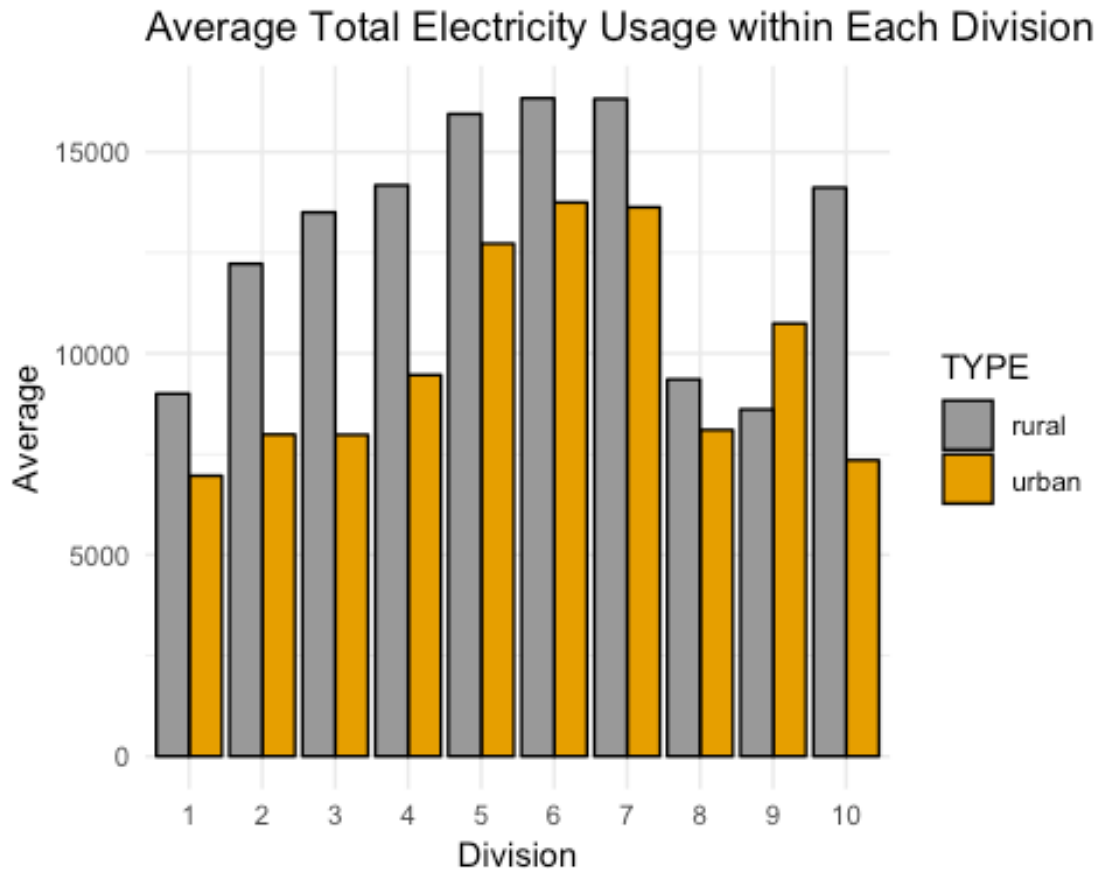
Average total electricity usage in kilowatt hours in each division

Average Total Electricity Usage within Each Division.

| Division | Average | Std_error | Lower bound | Upper bound |
|----------|----------|-----------|-------------|-------------|
| 1 | 7514.56 | 380.07 | 6769.63 | 8259.49 |
| 2 | 8465.44 | 139.51 | 8192.01 | 8738.87 |
| 3 | 9128.66 | 144.85 | 8844.76 | 9412.56 |
| 4 | 10523.83 | 321.25 | 9894.19 | 11153.47 |
| 5 | 13446.62 | 191.76 | 13070.77 | 13822.47 |
| 6 | 14535.97 | 444.16 | 13665.44 | 15406.50 |
| 7 | 14324.26 | 303.36 | 13729.68 | 14918.84 |
| 8 | 8384.47 | 460.38 | 7482.13 | 9286.81 |
| 9 | 10442.02 | 895.47 | 8686.93 | 12197.11 |

10 8100.41 127.05 7851.40 8349.41
Average Total Electricity Usage (Urban/Rural) within Each Division.

| Division | Type | Average | Std_error | Lower bound | Upper bound |
|----------|-------|----------|-----------|-------------|-------------|
| 1 | rural | 9001.05 | 1150.95 | 6745.24 | 11256.87 |
| 1 | urban | 6963.86 | 540.43 | 5904.64 | 8023.08 |
| 2 | rural | 12223.39 | 808.95 | 10637.87 | 13808.91 |
| 2 | urban | 7987.29 | 164.91 | 7664.07 | 8310.51 |
| 3 | rural | 13500.02 | 766.99 | 11996.76 | 15003.29 |
| 3 | urban | 7980.07 | 215.41 | 7557.88 | 8402.25 |
| 4 | rural | 14173.93 | 800.70 | 12604.59 | 15743.28 |
| 4 | urban | 9466.52 | 375.20 | 8731.14 | 10201.90 |
| 5 | rural | 15941.99 | 569.97 | 14824.88 | 17059.10 |
| 5 | urban | 12724.60 | 291.19 | 12153.87 | 13295.33 |
| 6 | rural | 16332.68 | 1159.29 | 14060.51 | 18604.85 |
| 6 | urban | 13747.31 | 796.85 | 12185.50 | 15309.11 |
| 7 | rural | 16317.16 | 1160.85 | 14041.94 | 18592.38 |
| 7 | urban | 13628.52 | 397.54 | 12849.34 | 14407.69 |
| 8 | rural | 9356.00 | 1878.16 | 5674.87 | 13037.13 |
| 8 | urban | 8099.38 | 365.16 | 7383.67 | 8815.09 |
| 9 | rural | 8610.43 | 1065.26 | 6522.56 | 10698.29 |
| 9 | urban | 10742.91 | 1301.13 | 8192.73 | 13293.08 |
| 10 | rural | 14114.76 | 1071.61 | 12014.45 | 16215.07 |
| 10 | urban | 7348.88 | 225.96 | 6906.01 | 7791.75 |



Question 3 c

Proportion of Homes with Internet Access within Each Division.

| Division | Prop. Disparity(%) | Std_error | Lower bound(%) | Upper bound(%) |
|----------|--------------------|-----------|----------------|----------------|
| 1 | 1.78 | 3.00 | -4.10 | 7.66 |
| 2 | -1.95 | 4.03 | -9.86 | 5.96 |
| 3 | 0.04 | 2.61 | -5.07 | 5.15 |
| 4 | 7.68 | 4.78 | -1.69 | 17.05 |
| 5 | 3.26 | 3.27 | -3.14 | 9.66 |
| 6 | 9.33 | 4.86 | -0.18 | 18.85 |
| 7 | 5.10 | 3.52 | -1.80 | 12.01 |
| 8 | 5.50 | 4.93 | -4.16 | 15.15 |
| 9 | 18.52 | 4.72 | 9.26 | 27.77 |
| 10 | 3.43 | 4.17 | -4.75 | 11.61 |

Which division has the largest disparity between urban and rural areas in terms of the proportion of homes with internet access?

division 9