Homework 4

Q1) Importing CSV file

Ans:

dataset = read.csv("/Users/Raja/Desktop/FAA_r.csv", header = TRUE,sep=",")

Returns the dataset of type dataframe.

To find the instruction on how to use the functions

We use

>?read.scv - to find the instrunctions

>??read.csv – lookup for finding matching function name

Q2. How many variables in the data set ? what are their names?

Ans:

length(colnames(dataset))

7

length of colnames gives variables in the data set

colnames(dataset)

"type" "duration" "no_psng" "speed_ground" "speed_air" "height" "pitch"

colnames prints the names of those column names

Q3.How many Observations in total? How many observations for Airbus?

str(dataset)

'data.frame': 800 obs. of 7 variables:

$ type : Factor w/ 2 levels "Airbus","Boeing": 1 2 1 2 1 2 1 2 1 1 ...

$ duration : num 121 152 131 273 168 ...

$ no_psng : int 58 68 45 69 66 60 64 64 64 65 ...

$ speed_ground: num 85.3 73.2 112.1 57.1 80.3 ...

$ speed_air : num NA NA 111 NA NA ...

$ height : num 26.6 14.4 18.1 44.5 37.9 ...

$ pitch : num 3.65 3.89 4.01 4.03 4.33 ...

str gives the no. of observations and no. of variables and their details

there are 800 observations in the given dataset.

length(dat[dat$type=='Airbus',1])

400

there are 400 observations for Airbus

4. Calculate the mean for each of the flight parameters (measures). Please also report the corresponding standard deviation.

Ans:

Duration:

> mean(dat$duration)

[1] 149.174

> sd(dat$duration)

[1] 50.38649

No_psng:

> mean(dat$no_psng)

[1] 60.04

> sd(dat$no_psng)

[1] 7.840615

speed_ground

> mean(dat$speed_ground)

[1] 79.35776

> sd(dat$speed_ground)

[1] 20.19064

speed_air

speed_air has some NA values, used na.rm=t to remove not availables

> mean(dat$ speed_air,na.rm=T)

[1] 102.0379

> sd(dat$ speed_air,na.rm=T)

[1] 10.3253

height

> mean(dat$height)

[1] 29.75949

> sd(dat$height)

[1] 10.04644

pitch

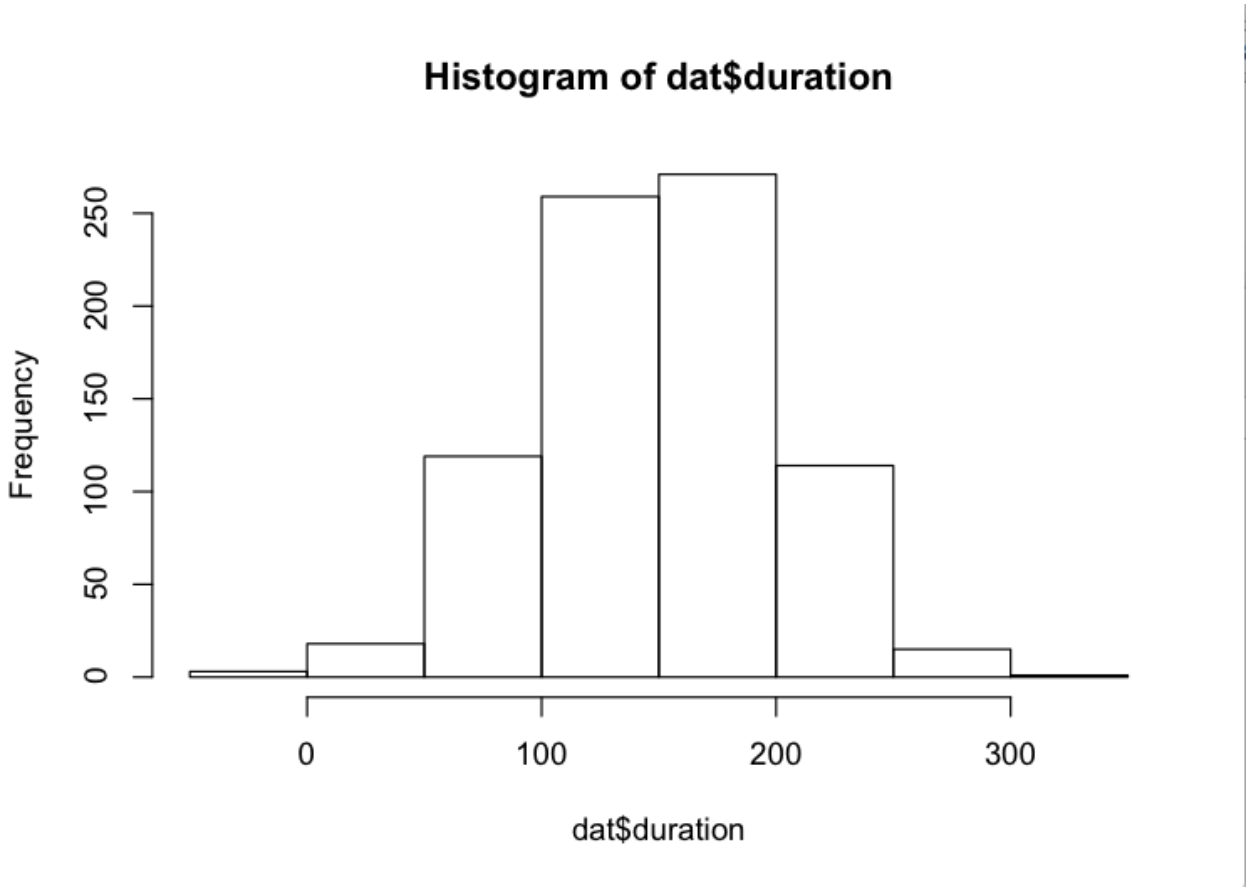
> mean(dat$pitch)

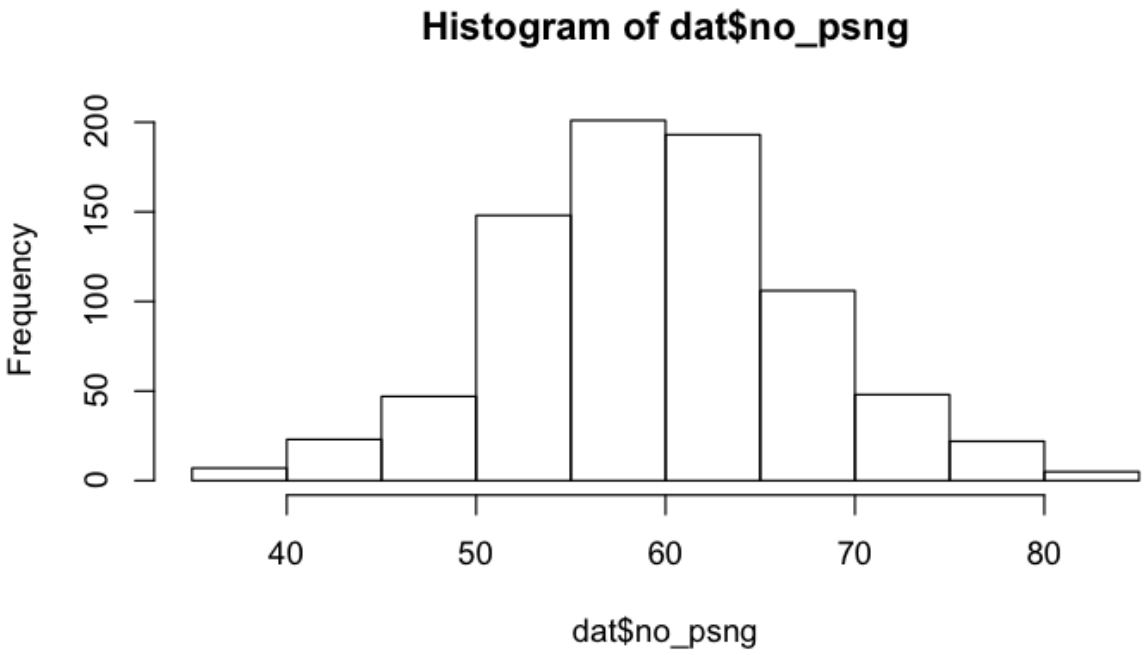
[1] 4.170417

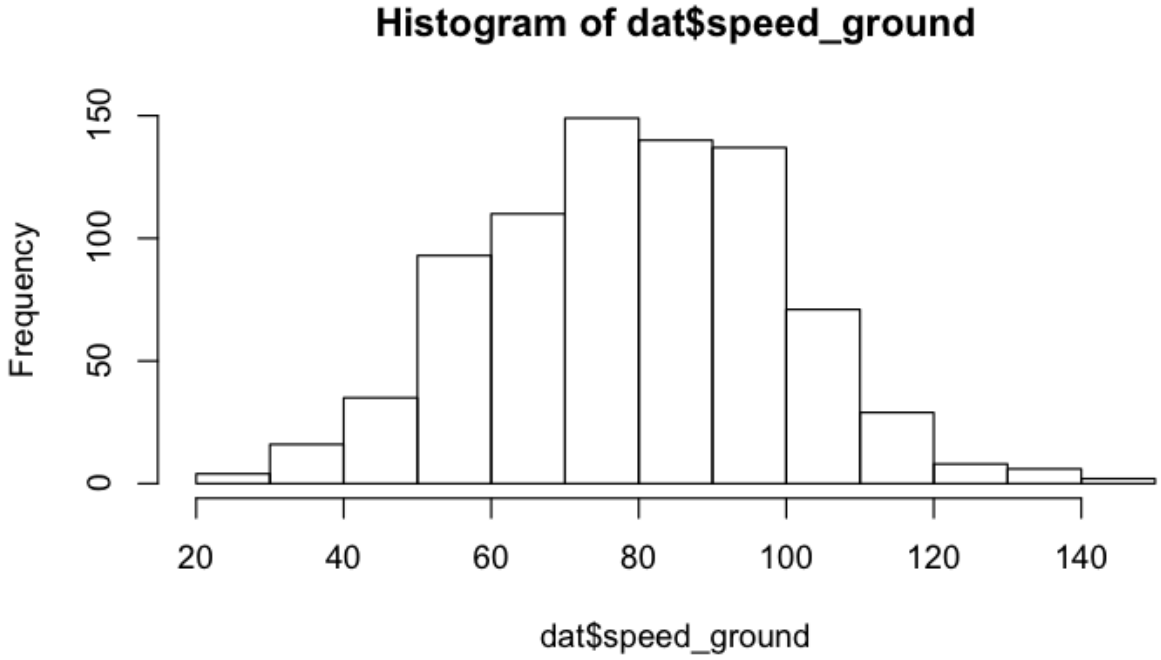
> sd(dat$pitch)

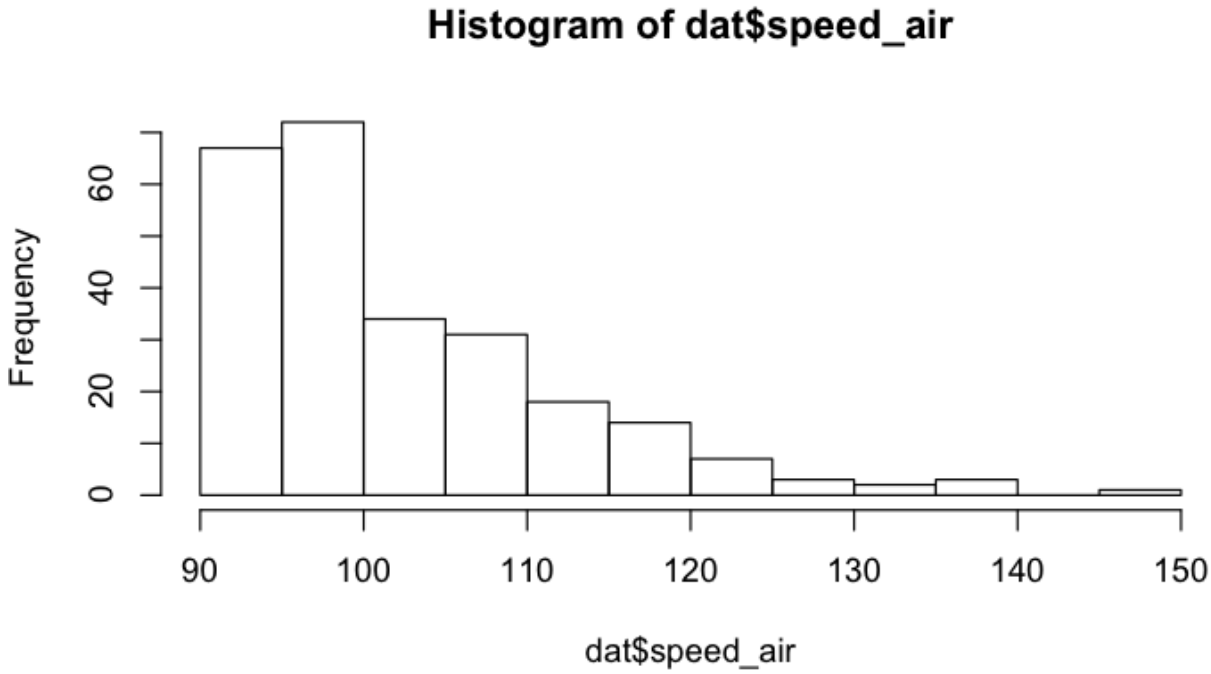
[1] 0.49442

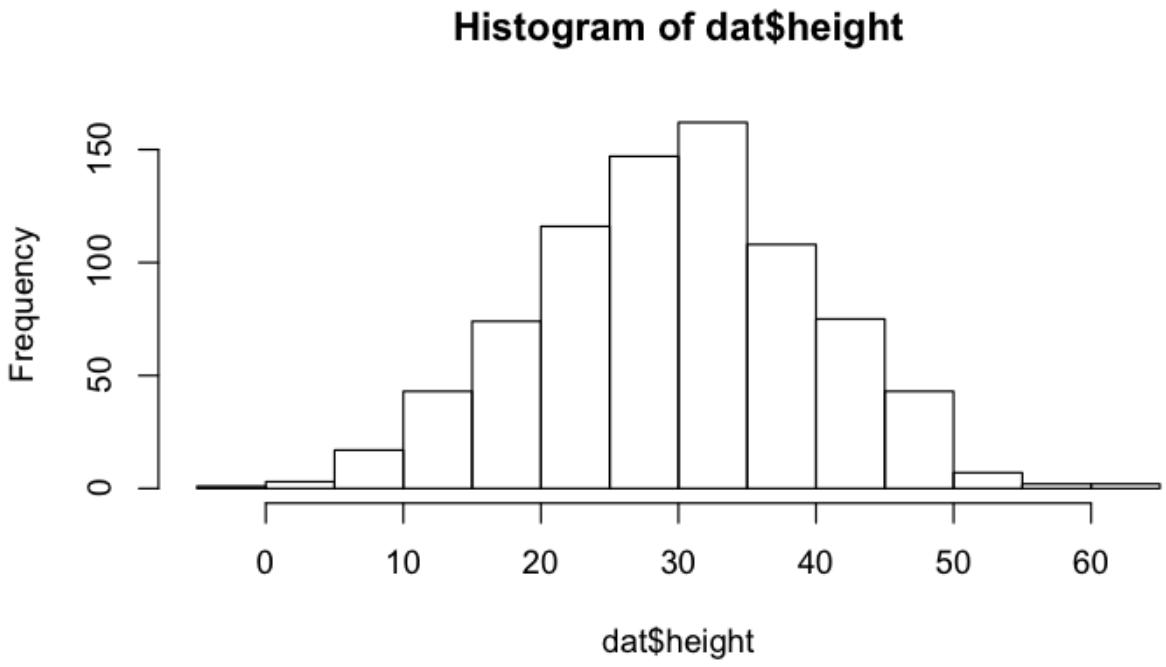
5. Histograms

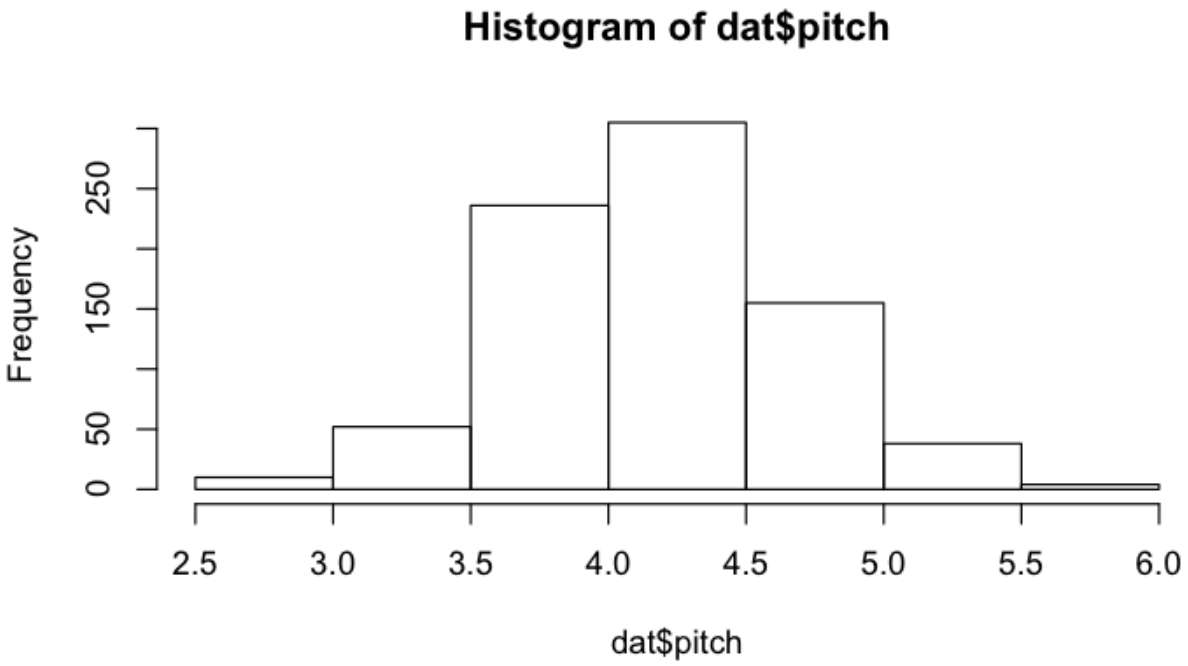



Histogram of dat$no_psng
Frequency
0
50
100
150
200
40
50
60
70
80
dat$no_psng


Histogram of dat$speed_ground
Frequency
0
50
100
150
20
40
60
80
100
120
140
dat$speed_ground


Histogram of dat$speed_air
Frequency
0
20
40
60
90
100
110
120
130
140
150
dat$speed_air


Histogram of dat$height
Frequency
0
50
100
150
0
10
20
30
40
50
60
dat$height



6.Missing Values

summary(dat)

type	duration	no_psng	speed_ground	speed_air	height	pitch
Airbus:400	Min. :-21.39	Min. :37.00	Min. : 23.40	Min. : 90.13	Min. :-1.366	Min. :2.654
Boeing:400	1st Qu.:115.80	1st Qu.:55.00	1st Qu.: 65.55	1st Qu.: 94.72	1st Qu.:23.143	1st Qu.:3.853
	Median :150.40	Median :60.00	Median : 79.60	Median : 98.36	Median :29.944	Median :4.151
	Mean :149.17	Mean :60.04	Mean : 79.36	Mean :102.04	Mean :29.759	Mean :4.170
	3rd Qu.:182.81	3rd Qu.:65.00	3rd Qu.: 93.61	3rd Qu.:107.42	3rd Qu.:36.367	3rd Qu.:4.494
	Max. :314.35	Max. :84.00	Max. :149.42	Max. :148.73	Max. :61.206	Max. :5.911
				NA's :548		

From the above table, it shows that there 548 not available values for speed_air. To explore the data, We use summary to display the results.

is.na(dat$speed_air) gives the missing values as True and remaining false.

Q7

Ans: speed of the air flow (defined as the difference between speed_ground and speed_air).

>airflow=(dat$speed_air-speed_ground);

```
>mean(airflow,na.rm=T)
[1] 0.08395205
```

Q8)

Ans:

```
 sum(dat$duration<40)
[1] 9
```

totally there are 9 flights whose duration less than 40.

```
dat[dat$duration<40,]
     type   duration no_psng speed_ground speed_air    height    pitch
26  Boeing  -3.630527      57     69.70764        NA 32.184000 3.737644
130 Airbus -21.389093      57     75.04745        NA 24.644355 3.635539
318 Airbus  18.017157      53     98.20148  98.42889 27.065475 3.962545
363 Boeing  -1.225362      62     83.25273        NA  7.218443 3.898639
364 Airbus  32.559910      60     58.54371        NA 35.432061 4.215479
377 Boeing   9.590482      70     97.80262  97.57404 45.108303 3.969965
598 Airbus  24.525263      52     70.48631        NA 23.919686 4.440839
640 Airbus  16.582249      60    106.29541 104.96263 40.915652 4.784315
725 Airbus  28.487486      48     32.03438        NA 25.354042 4.487389
```

There are 6 flights whose heights is less than 6

```
sum(dat$height<6)
[1] 6
```

Removing observations whose duration <40 and height <6

```
> temp=dat[!dat$duration<40,]
> temp=temp[!temp$height<6,]
```

```
summary(temp)
   type        duration         no_psng       speed_ground     speed_air          height          pitch
 Airbus:391   Min.   : 40.38   Min.   :37.00   Min.   : 23.40   Min.   : 90.13   Min.   : 6.20   Min.   :2.654
 Boeing:394   1st Qu.:116.96   1st Qu.:55.00   1st Qu.: 65.08   1st Qu.: 94.59   1st Qu.:23.21   1st Qu.:3.852
              Median :151.80   Median :60.00   Median : 79.56   Median : 98.36   Median :30.16   Median :4.152
              Mean   :151.00   Mean   :60.08   Mean   : 79.33   Mean   :102.10   Mean   :29.97   Mean   :4.171
              3rd Qu.:183.25   3rd Qu.:65.00   3rd Qu.: 93.56   3rd Qu.:107.46   3rd Qu.:36.49   3rd Qu.:4.497
               Max.   :314.35   Max.   :84.00   Max.   :149.42   Max.   :148.73   Max.   :61.21   Max.   :5.911
                                                                                  NA's   :539
```

Q9) Divide the cleaned data set (as obtained in Step 8) into two subsets: Airbus and Boeing.

```
>airbusdataset=temp[temp$type=="Airbus",]
>summary(airbusdataset)
```

```
 type          duration         no_psng      speed_ground       speed_air            height          pitch
Airbus:391   Min.   : 40.85   Min.   :37.0   Min.   : 26.64      Min.   : 90.17      Min.   : 6.20   Min.   :2.700
Boeing:  0   1st Qu.:121.43   1st Qu.:55.0   1st Qu.: 66.57      1st Qu.: 94.98      1st Qu.:22.43   1st Qu.:3.841
             Median :149.23   Median :60.0   Median : 79.56      Median : 98.97      Median :29.74   Median :4.146
             Mean   :152.09   Mean   :60.4   Mean   : 79.86      Mean   :102.37      Mean   :29.65   Mean   :4.177
             3rd Qu.:184.09   3rd Qu.:65.0   3rd Qu.: 93.57      3rd Qu.:107.95      3rd Qu.:36.56   3rd Qu.:4.516
             Max.   :314.35   Max.   :84.0   Max.   :149.42      Max.   :148.73      Max.   :61.21   Max.   :5.911
                                                                 NA's   :268
```

```
> boeingdataset=temp[temp$type=="Boeing",]
> summary(boeingdataset)
   type          duration         no_psng      speed_ground       speed_air            height          pitch
Airbus:  0   Min.   : 40.38   Min.   :38.00   Min.   : 23.40   Min.   : 90.13      Min.   : 6.306   Min.   :2.654
Boeing:394   1st Qu.:114.26   1st Qu.:55.00   1st Qu.: 63.49   1st Qu.: 93.85      1st Qu.:24.044   1st Qu.:3.873
             Median :153.13   Median :60.00   Median : 79.57   Median : 98.02      Median :30.353   Median :4.162
             Mean   :149.91   Mean   :59.76   Mean   : 78.80   Mean   :101.83      Mean   :30.287   Mean   :4.164
             3rd Qu.:182.28   3rd Qu.:65.00   3rd Qu.: 93.52   3rd Qu.:106.80      3rd Qu.:36.438   3rd Qu.:4.472
             Max.   :278.46   Max.   :83.00   Max.   :142.55   Max.   :139.67      Max.   :58.696   Max.   :5.537
                                                               NA's   :271
```

Q10)

There are 391 observations in Airbus and 394 observations in Boeing

Mean height of Airbus and Boeing are 29.65 and 30.287
Mean pitch of Airbus and Boeing are 4.146 and 4.164
Mean speed_ground of Airbus and Boeing are 79.56 and 79.57
Mean speed_air of Airbus and Boeing are 102.37 and 101.83

From the above observation, there is no major difference between these two aircraft makes.