1. 26 variables.

Categorical or qualitative variables: Year, Month, DayOfMonth, DayOfWeek, DepTime, ArrTime, UniqueCarrier, FlightNum, Origin, Dest.

Quantitative or numeric variables: rest of the variable.

- What is the standard deviation of Distance in this dataset?
 What is the range of distance in this dataset?
- airline2008NovS <read.delim("~/Desktop/STAT350/STAT350/Labs/Lab1/airline200 8NovS.txt")
- 4. There are 3 missing values (NA) in the dataset.

(a)

cleaned <-airline2008NovS[complete.cases(airline2008NovS),] dim(cleaned)

View(cleaned)

write.table(helicon_cleaned,file="airCleaned.txt",quote=F,
 row.names=F, sep="\t")

(b) 9997 observations.

(c) ~/Desktop/STAT350/STAT350/Labs/Lab1 5. (a) airline2008NovS_new <- airline2008NovS_cleaned airline2008NovS_new\$Dest <as.character(airline2008NovS_new\$Dest) airline2008NovS_new\$Dest[airline2008NovS_new\$Dest== "ATL"]<-"Atlanta" airline2008NovS_new\$Dest[airline2008NovS_new\$Dest== "CHS"]<-"CharlestonAFB" airline2008NovS_new\$Dest[airline2008NovS_new\$Dest== "DFW"]<-"DallasFtWorth" airline2008NovS_new\$Dest[airline2008NovS_new\$Dest== "MSP"]<-"MinneapolisStPaul" View(airline2008NovS_new)

(b)

```
> airline2008NovS_new <- airline2008NovS_cleaned
> airline2008NovS_new$Dest <- as.character(airline2008NovS_new$Dest)</pre>
> airline2008NovS_new$Dest[airline2008NovS_new$Dest=="ATL"]<-"Atlanta"
> airline2008NovS_new$Dest[airline2008NovS_new$Dest=="CHS"]<-"CharlestonAFB"
> airline2008NovS_new$Dest[airline2008NovS_new$Dest=="DFW"]<-"DallasFtWorth'
> airline2008NovS_new$Dest[airline2008NovS_new$Dest=="MSP"]<-"MinneapolisStPaul"
> View(airline2008NovS_new)
> head(airline2008NovS_new)
  Year Month DayofMonth DayOfWeek DepTime CRSDepTime ArrTime CRSArrTime UniqueCarrier FlightNum TailNum ActualElapsedTime
                                                                                 9E
1 2008
         11
                     1
                              6 1001
                                               913
                                                      1153
                                                                  1125
                                                                                         3747 86319E
2 2008
                                    2116
                                               2120
                                                       2345
                                                                  2259
                                                                                          2824
                                                                                               85339E
3 2008
                                    1330
                                               1235
                                                                  1413
                                                                                               91709E
4 2008
                                    1435
         11
                                               1400
                                                       1539
                                                                  1518
                                                                                 9E
                                                                                               91629E
                                                                                                                     64
                                                                                         2024
5 2008
         11
                                    1225
                                               1211
                                                       1400
                                                                  1320
                                                                                 9E
                                                                                         2024
                                                                                               91629E
                                                                                                                     95
                                    1950
                                                                  2320
                                                                                               N5BYAA
  CRSElapsedTime AirTime ArrDelay DepDelay Origin
                                                         Dest Distance TaxiIn TaxiOut CarrierDelay WeatherDelay NASDelay
                                    48 DTW
            132
                    99
                              28
                                                          SAV
                                                                    706
                                                                                                28
                                             MSP
                                                           IDA
                                                                    939
             98
                              43
                                       55
                                             CVG
                                                           PHL
                                                                    507
                                                                                    12
                                   35 CHS Atlanta
14 ATL CharlestonAFB
BOS
             78
                                                                    259
                                                                            13
                     42
                              21
             69
                              40
                                                                    259
                                                                          20
                                                                                    28
                                                                                                                      26
            210
                    191
                              57
                                                                   1562
 SecurityDelay LateAircraftDelay
             0
             0
                              21
5
```

- 6. (9 points) We are going to see if the variable "ActualElapsedTime" can be calculated from other variables in the data set.
- a. (3 pts.) Write down a mathematical equation to calculate
 "ActualElapsedTime" from "AirTime", "Taxiln" and "Taxiout".

ActualElapsedTime = AirTime + TaxiIn +Taxiout

b. (3 pts.)

airline2008NovS_new\$ActualElapsedTime = airline2008NovS_new\$AirTime + airline2008NovS_new\$TaxiIn +airline2008NovS_new\$TaxiOut

head(airline2008NovS_new)

c. (3 pts.)

	Year	Month	Dayo	fMonth	DayOfWeek	DepTime	CRSDepT ⁻	ime ArrTime	CRSA	ArrTime	UniqueCo	arrier F	lightNum	TailNum	ActualElap	osedTime	
1	2008	11		1	6	1001	9	913 1153		1125		9E	3747	86319E		112	
2	2008	11		1	6	2116	2:	120 2345		2259		9E	2824	85339E		209	
3	2008	11		1	6	1330	1	235 1456		1413		9E	2070	91709E		86	
4	2008	11		1	6	1435	14	100 1539		1518		9E	2024	91629E		64	
5	2008	11		1	6	1225	17	211 1400		1320		9E	2024	91629E		95	
6	2008	11		1	6	1950	1	350 17		2320		AA	614	N5BYAA		207	
	CRSET	LapsedT	ime	AirTime	ArrDelay	DepDelay	Origin	D	est [Distance	TaxiIn	TaxiOut	: Carrier	Delay Wed	atherDelay	NASDelay	
1			132	99	28	48	DTW		SAV	706	4	9)	28	0	0	
2			159	130	46	-4	MSP		IDA	939	5	74		0	0	46	
3			98	70	43	55	CVG		PHL	507	4	12	2	0	0	0	
4			78	42	21	35	CHS	Atla	nta	259	13	9)	0	0	0	
5			69	47	40	14	ATL	Charleston	AFB	259	20	28	3	14	0	26	
6			210	191	. 57	60	DFW		BOS	1562	5	11	L	14	0	0	
	Secur	rityDel	ay L	.ateAiro	raftDelay												
1			0		0												
2			0		0												
3			0		43												
4			0		21												
5			0		0												

6 0 43 > head(airline2008NovS_cleaned)

-	neau	Carretine	ZUUONUV3_C	Leanea										
	Year	Month D	ayofMonth	DayOfWeek	DepTime	CRSDepTin	e ArrTim	e CRSArrTime	: UniqueC	arrier	FlightNum	TailNum	ActualElap	osedTime
1	2008	11	1	6	1001	91	.3 115	3 1125	,	9E	3747	86319E		112
2	2008	11	1	6	2116	212	0 234	5 2259)	9E	2824	85339E		209
3	2008	11	1	6	1330	123	5 145	6 1413	}	9E	2070	91709E		86
4	2008	11	1	6	1435	140	0 153	9 1518	3	9E	2024	91629E		64
5	2008	11	1	6	1225	121	.1 140	0 1320)	9E	2024	91629E		95
6	2008	11	1	6	1950	185	0 1	7 2320)	AA	614	N5BYAA		207
	CRSET	lapsedTi	me AirTime	ArrDelay	DepDelay	Origin [est Dist	ance TaxiIn	TaxiOut	Carrier	Delay Weat	therDelay	NASDelay	SecurityDelay
1	CRSET		me AirTime 32 99		DepDelay 48		est Dist SAV	ance TaxiIn 706 4	TaxiOut 9	Carrier	Delay Weat 28	therDelay (NASDelay 0	SecurityDelay 0
1 2	CRSET	. 1		28		DTW			TaxiOut 9 74	Carrier		therDelay (NASDelay 0 46	SecurityDelay 0 0
1 2 3	CRSET	1	.32 99	28	48	DTW MSP	SAV	706 4	9	Carrier		therDelay (((0 46	SecurityDelay 0 0 0
1 2 3 4	CRSET	1	.32 99 .59 130	28 46 43	48 -4	DTW MSP CVG	SAV IDA	706 4 939 5	9 74	Carrier		(0 46	SecurityDelay 0 0 0 0
1 2 3 4 5	CRSET	1	32 99 59 130 98 70	28 46 43 2 21	48 -4 55	DTW MSP CVG CHS	SAV IDA PHL	706 4 939 5 507 4	9 74 12	Carrier		(9 0 9 46 9 0	SecurityDelay 0 0 0 0 0 0
1 2 3 4 5 6	CRSET	1	32 99 59 130 98 70 78 42	28 46 43 2 21 40	48 -4 55 35	DTW MSP CVG CHS	SAV IDA PHL ATL CHS	706 4 939 5 507 4 259 13	9 74 12 9	Carrier	28 0 0	6	0 46 0 0 0 0 0 26	SecurityDelay 0 0 0 0 0 0

LateAircraftDelay

LoteAircraftDelay

LoteAircraftDelay 1 2 3 4 5