Homework 3

Hamed

2/9/2020

(a). Read the data into a data frame in R

```
pdcalls=read.csv("jerseycitypdservicecalls2017csv.csv",header = T)
attach(pdcalls)
head(pdcalls,6)
```

```
##   event.number district       time.received shift     time.dispatched
## 1    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 2    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 3    17-000003        W 01/01/2017 00:05:17     1 01/01/2017 00:07:00
## 4    17-000004        E 01/01/2017 00:05:52     1 01/01/2017 00:08:00
## 5    17-000005        S 01/01/2017 00:06:55     1 01/01/2017 00:08:00
## 6    17-000006        W 01/01/2017 00:09:15     1 01/01/2017 00:13:00
##          time.arrived callcode
## 1 01/01/2017 00:20:00   F18.00
## 2 01/01/2017 00:20:00   F18.00
## 3 01/01/0001 00:00:00   F16.00
## 4 01/01/0001 00:00:00   B21.00
## 5 01/01/0001 00:00:00   B23.20
## 6 01/01/2017 00:23:00   C14.20
##
call.code.description
## 1 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 2 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 3                  SUSPICIOUS PERSON/CONDITION; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 4                    MERCHANT/CUSTOMER DISPUTE; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 5                   OTHER INTER/CONFLICT; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
## 6                   DAMAGE MOTOR VEHICLE; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
##   call.type priority unit.id is.primary              address        city
## 1        PH        2    W601          1       40 JONES ST;   JERSEY CITY
## 2        PH        2    W101          0       40 JONES ST;   JERSEY CITY
## 3        PH        5    W401          1 20 TONNELE AVE; 3B   JERSEY CITY
## 4        PH        5    E501          1   2 FAIRMOUNT AVE;   JERSEY CITY
## 5        PH        2    S201          1 105 WILKINSON AVE;   JERSEY CITY
## 6       911        4    W201          1   2 WILMOT AVE; 13   JERSEY CITY
##   latitude longitude geo.count  geo.error
## 1 40.73022 -74.06236         1 S5HPNTSCZA
```

```
## 2 40.73022 -74.06236         1 S5HPNTSCZA
## 3 40.73093 -74.06704         1 S5HPNTSCZA
## 4 40.71735 -74.06103         1 S5HPNTSCZA
## 5 40.70592 -74.08002         1 S5HPNTSCZA
## 6  0.00000   0.00000         0  Not Found
```

(b). Find the number of variables and number of rows of data, The first number is for rows and the second for variables

```
dim(pdcalls)
```

```
## [1] 107335     18
```

(c). Inspect the data by printing out the first six rows.

```
head(pdcalls,6)
```

```
##   event.number district       time.received shift     time.dispatched
## 1    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 2    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 3    17-000003        W 01/01/2017 00:05:17     1 01/01/2017 00:07:00
## 4    17-000004        E 01/01/2017 00:05:52     1 01/01/2017 00:08:00
## 5    17-000005        S 01/01/2017 00:06:55     1 01/01/2017 00:08:00
## 6    17-000006        W 01/01/2017 00:09:15     1 01/01/2017 00:13:00
##          time.arrived callcode
## 1 01/01/2017 00:20:00   F18.00
## 2 01/01/2017 00:20:00   F18.00
## 3 01/01/0001 00:00:00   F16.00
## 4 01/01/0001 00:00:00   B21.00
## 5 01/01/0001 00:00:00   B23.20
## 6 01/01/2017 00:23:00   C14.20
##
call.code.description
## 1 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 2 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 3                  SUSPICIOUS PERSON/CONDITION; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 4                    MERCHANT/CUSTOMER DISPUTE; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 5                   OTHER INTER/CONFLICT; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
## 6                   DAMAGE MOTOR VEHICLE; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
##   call.type priority unit.id is.primary              address        city
## 1        PH        2    W601          1       40 JONES ST;   JERSEY CITY
## 2        PH        2    W101          0       40 JONES ST;   JERSEY CITY
## 3        PH        5    W401          1 20 TONNELE AVE; 3B   JERSEY CITY
## 4        PH        5    E501          1   2 FAIRMOUNT AVE;   JERSEY CITY
## 5        PH        2    S201          1 105 WILKINSON AVE;   JERSEY CITY
## 6       911        4    W201          1   2 WILMOT AVE; 13   JERSEY CITY
```

```
##   latitude longitude geo.count  geo.error
## 1 40.73022 -74.06236         1 S5HPNTSCZA
## 2 40.73022 -74.06236         1 S5HPNTSCZA
## 3 40.73093 -74.06704         1 S5HPNTSCZA
## 4 40.71735 -74.06103         1 S5HPNTSCZA
## 5 40.70592 -74.08002         1 S5HPNTSCZA
## 6  0.00000   0.00000         0  Not Found
```

(d). How many rows are there with missing values?

```
sum(!complete.cases(pdcalls))

## [1] 55
```

(e). Remove the rows with missing data

```
dim(pdcalls) #Before removing the missing data

## [1] 107335     18

pdcalls <- pdcalls[complete.cases(pdcalls), ]

dim(pdcalls) #After removing the missing data

## [1] 107280     18
```

(f). Check to see if there are any duplicate rows. If there are duplicate rows then remove them.

```
which(duplicated(pdcalls)) #check for duplicates

## integer(0)

dim(pdcalls) #dimension of the dataframe before removing duplicates

## [1] 107280     18

pdcalls=pdcalls[!duplicated(pdcalls), ] #remove duplicates
dim(pdcalls)

## [1] 107280     18
```

(g). Sort the data by call type

```
head(pdcalls) #Before the sorting

##   event.number district       time.received shift     time.dispatched
## 1    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 2    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 3    17-000003        W 01/01/2017 00:05:17     1 01/01/2017 00:07:00
## 4    17-000004        E 01/01/2017 00:05:52     1 01/01/2017 00:08:00
## 5    17-000005        S 01/01/2017 00:06:55     1 01/01/2017 00:08:00
## 6    17-000006        W 01/01/2017 00:09:15     1 01/01/2017 00:13:00
##          time.arrived callcode
## 1 01/01/2017 00:20:00   F18.00
## 2 01/01/2017 00:20:00   F18.00
```

```
## 3 01/01/0001 00:00:00   F16.00
## 4 01/01/0001 00:00:00   B21.00
## 5 01/01/0001 00:00:00   B23.20
## 6 01/01/2017 00:23:00   C14.20
##
call.code.description
## 1 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 2 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 3                  SUSPICIOUS PERSON/CONDITION; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 4                    MERCHANT/CUSTOMER DISPUTE; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 5                   OTHER INTER/CONFLICT; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
## 6                   DAMAGE MOTOR VEHICLE; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
##   call.type priority unit.id is.primary              address        city
## 1        PH        2    W601          1       40 JONES ST;   JERSEY CITY
## 2        PH        2    W101          0       40 JONES ST;   JERSEY CITY
## 3        PH        5    W401          1 20 TONNELE AVE; 3B   JERSEY CITY
## 4        PH        5    E501          1   2 FAIRMOUNT AVE;   JERSEY CITY
## 5        PH        2    S201          1 105 WILKINSON AVE;   JERSEY CITY
## 6       911        4    W201          1   2 WILMOT AVE; 13   JERSEY CITY
##   latitude longitude geo.count  geo.error
## 1 40.73022 -74.06236         1 S5HPNTSCZA
## 2 40.73022 -74.06236         1 S5HPNTSCZA
## 3 40.73093 -74.06704         1 S5HPNTSCZA
## 4 40.71735 -74.06103         1 S5HPNTSCZA
## 5 40.70592 -74.08002         1 S5HPNTSCZA
## 6  0.00000   0.00000         0  Not Found

head(pdcalls[order(call.type),]) #After sorting

##    event.number district       time.received shift     time.dispatched
## 6     17-000006        W 01/01/2017 00:09:15     1 01/01/2017 00:13:00
## 13    17-000018        W 01/01/2017 00:20:40     1 01/01/2017 00:23:00
## 15    17-000020        S 01/01/2017 00:23:52     1 01/01/2017 00:25:00
## 16    17-000021        W 01/01/2017 00:25:23     1 01/01/2017 00:28:00
## 21    17-000027        S 01/01/2017 00:33:17     1 01/01/2017 00:34:00
## 22    17-000027        S 01/01/2017 00:33:17     1 01/01/2017 00:34:00
##           time.arrived callcode
## 6  01/01/2017 00:23:00   C14.20
## 13 01/01/2017 00:28:00   H31.00
## 15 01/01/0001 00:00:00   F16.00
## 16 01/01/2017 00:34:00   A12.00
## 21 01/01/2017 00:38:00   F18.00
## 22 01/01/2017 00:38:00   F18.00
##
```

```
call.code.description
## 6                    DAMAGE MOTOR VEHICLE; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
## 13                    PERSON DOWN/CAUSE UNKNOWN; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 15                   SUSPICIOUS PERSON/CONDITION; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 16                             ASSAULT NO WEAPON; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 21 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 22 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
##    call.type priority unit.id is.primary
address
## 6        911        4    W201          1                 2 WILMOT AVE; 13
## 13       911        2    W101          1       EMORY ST & MONTICELLO AVE;
## 15       911        3    S501          1                    12 WEGMAN CT;
## 16       911        5    W201          1 205 MONTICELLO (MONTICELLO AVE);
## 21       911        2    S601          0                  213 FULTON AVE;
## 22       911        2    S201          1                  213 FULTON AVE;
##           city latitude longitude geo.count  geo.error
## 6  JERSEY CITY  0.00000   0.00000         0  Not Found
## 13 JERSEY CITY 40.71907 -74.07142         1         SX
## 15 JERSEY CITY 40.70072 -74.07793         1 S5HPNTSCZA
## 16 JERSEY CITY 40.72182 -74.06989         1 S5HPNTSCZA
## 21 JERSEY CITY 40.70488 -74.08734         1 S5HPNTSCZA
## 22 JERSEY CITY 40.70488 -74.08734         1 S5HPNTSCZA
```

(h). Create a new data frame called calls911 by filtering the original dataset for the 911 calls. Print out the first six rows and check if the filtering worked. How many 911 calls were there?

```
library(dplyr)

##
## 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

calls911=filter(pdcalls,call.type=='911') #create the dataframe
head(calls911)

##   event.number district       time.received shift     time.dispatched
## 1    17-000006        W 01/01/2017 00:09:15     1 01/01/2017 00:13:00
## 2    17-000018        W 01/01/2017 00:20:40     1 01/01/2017 00:23:00
## 3    17-000020        S 01/01/2017 00:23:52     1 01/01/2017 00:25:00
```

```
## 4    17-000021        W 01/01/2017 00:25:23     1 01/01/2017 00:28:00
## 5    17-000027        S 01/01/2017 00:33:17     1 01/01/2017 00:34:00
## 6    17-000027        S 01/01/2017 00:33:17     1 01/01/2017 00:34:00
##          time.arrived callcode
## 1 01/01/2017 00:23:00   C14.20
## 2 01/01/2017 00:28:00   H31.00
## 3 01/01/0001 00:00:00   F16.00
## 4 01/01/2017 00:34:00   A12.00
## 5 01/01/2017 00:38:00   F18.00
## 6 01/01/2017 00:38:00   F18.00
##
call.code.description
## 1                   DAMAGE MOTOR VEHICLE; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
## 2                    PERSON DOWN/CAUSE UNKNOWN; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 3                  SUSPICIOUS PERSON/CONDITION; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 4                             ASSAULT NO WEAPON; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 5 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 6 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
##   call.type priority unit.id is.primary                          address
## 1       911        4    W201          1                2 WILMOT AVE; 13
## 2       911        2    W101          1       EMORY ST & MONTICELLO AVE;
## 3       911        3    S501          1                     12 WEGMAN CT;
## 4       911        5    W201          1 205 MONTICELLO (MONTICELLO AVE);
## 5       911        2    S601          0                  213 FULTON AVE;
## 6       911        2    S201          1                  213 FULTON AVE;
##          city latitude longitude geo.count  geo.error
## 1 JERSEY CITY  0.00000   0.00000         0  Not Found
## 2 JERSEY CITY 40.71907 -74.07142         1         SX
## 3 JERSEY CITY 40.70072 -74.07793         1 S5HPNTSCZA
## 4 JERSEY CITY 40.72182 -74.06989         1 S5HPNTSCZA
## 5 JERSEY CITY 40.70488 -74.08734         1 S5HPNTSCZA
## 6 JERSEY CITY 40.70488 -74.08734         1 S5HPNTSCZA
```

```
# Number of 911 calls
nrow(calls911)
```

```
## [1] 23098
```

(i). Create a new variable (column) called dispatchduration by subtracting time.received from time.dispatched.

```
library(dplyr)
pdcalls$time_R<-as.POSIXct(strptime(pdcalls$time.received,
          format = "%m/%d/%Y %H:%M:%OS",tz = "EST"))
```

```
pdcalls$time_D<-as.POSIXct(strptime(pdcalls$time.dispatched,
          format = "%m/%d/%Y %H:%M:%OS", tz = "EST"))

pdcalls$dispatchduration<-difftime(pdcalls$time_D, pdcalls$time_R,
                                   units = "secs")



head(pdcalls)

##   event.number district       time.received shift     time.dispatched
## 1    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 2    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 3    17-000003        W 01/01/2017 00:05:17     1 01/01/2017 00:07:00
## 4    17-000004        E 01/01/2017 00:05:52     1 01/01/2017 00:08:00
## 5    17-000005        S 01/01/2017 00:06:55     1 01/01/2017 00:08:00
## 6    17-000006        W 01/01/2017 00:09:15     1 01/01/2017 00:13:00
##          time.arrived callcode
## 1 01/01/2017 00:20:00   F18.00
## 2 01/01/2017 00:20:00   F18.00
## 3 01/01/0001 00:00:00   F16.00
## 4 01/01/0001 00:00:00   B21.00
## 5 01/01/0001 00:00:00   B23.20
## 6 01/01/2017 00:23:00   C14.20
##
call.code.description
## 1 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 2 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 3                  SUSPICIOUS PERSON/CONDITION; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 4                    MERCHANT/CUSTOMER DISPUTE; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 5                   OTHER INTER/CONFLICT; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
## 6                    DAMAGE MOTOR VEHICLE; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
##   call.type priority unit.id is.primary              address        city
## 1        PH        2    W601          1       40 JONES ST;   JERSEY CITY
## 2        PH        2    W101          0       40 JONES ST;   JERSEY CITY
## 3        PH        5    W401          1 20 TONNELE AVE; 3B   JERSEY CITY
## 4        PH        5    E501          1   2 FAIRMOUNT AVE;   JERSEY CITY
## 5        PH        2    S201          1 105 WILKINSON AVE;   JERSEY CITY
## 6       911        4    W201          1   2 WILMOT AVE; 13   JERSEY CITY
##   latitude longitude geo.count  geo.error              time_R
## 1 40.73022 -74.06236         1 S5HPNTSCZA 2017-01-01 00:05:13
## 2 40.73022 -74.06236         1 S5HPNTSCZA 2017-01-01 00:05:13
## 3 40.73093 -74.06704         1 S5HPNTSCZA 2017-01-01 00:05:17
## 4 40.71735 -74.06103         1 S5HPNTSCZA 2017-01-01 00:05:52
## 5 40.70592 -74.08002         1 S5HPNTSCZA 2017-01-01 00:06:55
```

```
## 6  0.00000   0.00000         0  Not Found 2017-01-01 00:09:15
##                time_D dispatchduration
## 1 2017-01-01 00:06:00          47 secs
## 2 2017-01-01 00:06:00          47 secs
## 3 2017-01-01 00:07:00         103 secs
## 4 2017-01-01 00:08:00         128 secs
## 5 2017-01-01 00:08:00          65 secs
## 6 2017-01-01 00:13:00         225 secs
```

(j). Now check if there are missing values in the newly created column and also check for dispatch durations that are negative or zero. This is garbage data so remove these rows.

```
#Missing values
sum(!complete.cases(pdcalls$dispatchduration))
```

```
## [1] 0
```

```
#Negative values
nrow(pdcalls[pdcalls$dispatchduration<0,])
```

```
## [1] 3185
```

```
# Zero values
nrow(pdcalls[pdcalls$dispatchduration==0,])
```

```
## [1] 384
```

```
# Remove negative and zero values
pdcalls_clean=pdcalls[pdcalls$dispatchduration>0,]
dim(pdcalls_clean)
```

```
## [1] 103711     21
```

```
head(pdcalls_clean)
```

```
##   event.number district       time.received shift     time.dispatched
## 1    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 2    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 3    17-000003        W 01/01/2017 00:05:17     1 01/01/2017 00:07:00
## 4    17-000004        E 01/01/2017 00:05:52     1 01/01/2017 00:08:00
## 5    17-000005        S 01/01/2017 00:06:55     1 01/01/2017 00:08:00
## 6    17-000006        W 01/01/2017 00:09:15     1 01/01/2017 00:13:00
##          time.arrived callcode
## 1 01/01/2017 00:20:00   F18.00
## 2 01/01/2017 00:20:00   F18.00
## 3 01/01/0001 00:00:00   F16.00
## 4 01/01/0001 00:00:00   B21.00
## 5 01/01/0001 00:00:00   B23.20
## 6 01/01/2017 00:23:00   C14.20
##
call.code.description
## 1 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
```

```
## 2 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 3                  SUSPICIOUS PERSON/CONDITION; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 4                    MERCHANT/CUSTOMER DISPUTE; TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 5                   OTHER INTER/CONFLICT; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
## 6                   DAMAGE MOTOR VEHICLE; IN PROGRESS AND/OR ACTOR ON
SCENE; INJURY NOT APPLICABLE
##   call.type priority unit.id is.primary              address        city
## 1        PH        2    W601          1       40 JONES ST;   JERSEY CITY
## 2        PH        2    W101          0       40 JONES ST;   JERSEY CITY
## 3        PH        5    W401          1 20 TONNELE AVE; 3B   JERSEY CITY
## 4        PH        5    E501          1   2 FAIRMOUNT AVE;   JERSEY CITY
## 5        PH        2    S201          1 105 WILKINSON AVE;   JERSEY CITY
## 6       911        4    W201          1   2 WILMOT AVE; 13   JERSEY CITY
##   latitude longitude geo.count  geo.error              time_R
## 1 40.73022 -74.06236         1 S5HPNTSCZA 2017-01-01 00:05:13
## 2 40.73022 -74.06236         1 S5HPNTSCZA 2017-01-01 00:05:13
## 3 40.73093 -74.06704         1 S5HPNTSCZA 2017-01-01 00:05:17
## 4 40.71735 -74.06103         1 S5HPNTSCZA 2017-01-01 00:05:52
## 5 40.70592 -74.08002         1 S5HPNTSCZA 2017-01-01 00:06:55
## 6  0.00000   0.00000         0  Not Found 2017-01-01 00:09:15
##                 time_D dispatchduration
## 1 2017-01-01 00:06:00          47 secs
## 2 2017-01-01 00:06:00          47 secs
## 3 2017-01-01 00:07:00         103 secs
## 4 2017-01-01 00:08:00         128 secs
## 5 2017-01-01 00:08:00          65 secs
## 6 2017-01-01 00:13:00         225 secs
```

(k). Find the average (mean) dispatch duration using the new variable (column) you created above.

```
mean(pdcalls_clean$dispatchduration)

## Time difference of 95.01306 secs
```

(l). Find the average (mean) dispatch duration by call type

```
library(doBy)
summaryBy(dispatchduration~call.type, data=pdcalls_clean, FUN=mean)

##   call.type dispatchduration.mean
## 1       911             131.31167
## 2        IC             265.50000
## 3       MVS              55.15983
## 4        PH             113.00391
## 5        SI              45.95293
## 6       STA             119.40000
```

(m). How many rows contain the word GUNSHOTS in the call code description column.

```
length(grep("GUNSHOTS", pdcalls$call.code.description))
```

```
## [1] 1348
```

(n). Now create a data frame called gunshotdata that has just the rows that contain the word GUNSHOTS in the call code description

```
library(dplyr)
gunshotdata=dplyr::filter(pdcalls, grepl('GUNSHOTS', call.code.description))
head(gunshotdata)
```

```
##   event.number district       time.received shift     time.dispatched
## 1    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 2    17-000002        W 01/01/2017 00:05:13     1 01/01/2017 00:06:00
## 3    17-000011        S 01/01/2017 00:15:55     1 01/01/2017 00:17:00
## 4    17-000011        S 01/01/2017 00:15:55     1 01/01/2017 00:17:00
## 5    17-000027        S 01/01/2017 00:33:17     1 01/01/2017 00:34:00
## 6    17-000027        S 01/01/2017 00:33:17     1 01/01/2017 00:34:00
##          time.arrived callcode
## 1 01/01/2017 00:20:00   F18.00
## 2 01/01/2017 00:20:00   F18.00
## 3 01/01/2017 00:21:00   F18.00
## 4 01/01/2017 00:21:00   F18.00
## 5 01/01/2017 00:38:00   F18.00
## 6 01/01/2017 00:38:00   F18.00
##
call.code.description
## 1 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 2 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 3 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 4 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 5 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
## 6 GUNSHOTS FIRED HEARD ( NO WITNESS / VICTIM ); TIME ELAPSED NOT
APPLICABLE; INJURY NOT APPLICABLE
##   call.type priority unit.id is.primary                    address
## 1        PH        2    W601          1                40 JONES ST;
## 2        PH        2    W101          0                40 JONES ST;
## 3        PH        2    S601          1 SEAVIEW AVE & KENNEDY BLVD;
## 4        PH        2    S101          0 SEAVIEW AVE & KENNEDY BLVD;
## 5       911        2    S601          0             213 FULTON AVE;
## 6       911        2    S201          1             213 FULTON AVE;
##          city latitude longitude geo.count  geo.error             time_R
## 1 JERSEY CITY 40.73022 -74.06236         1 S5HPNTSCZA 2017-01-01 00:05:13
## 2 JERSEY CITY 40.73022 -74.06236         1 S5HPNTSCZA 2017-01-01 00:05:13
## 3 JERSEY CITY 40.69556 -74.09901         2         SX 2017-01-01 00:15:55
```

```
## 4 JERSEY CITY 40.69556 -74.09901         2         SX 2017-01-01 00:15:55
## 5 JERSEY CITY 40.70488 -74.08734         1 S5HPNTSCZA 2017-01-01 00:33:17
## 6 JERSEY CITY 40.70488 -74.08734         1 S5HPNTSCZA 2017-01-01 00:33:17
##                time_D dispatchduration
## 1 2017-01-01 00:06:00          47 secs
## 2 2017-01-01 00:06:00          47 secs
## 3 2017-01-01 00:17:00          65 secs
## 4 2017-01-01 00:17:00          65 secs
## 5 2017-01-01 00:34:00          43 secs
## 6 2017-01-01 00:34:00          43 secs
```