DSO 545: HW 1

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Load the data:

```
baggage = read.csv(here("HW1","Baggage.csv"), header=T,stringsAsFactors = F)
indus_med = read.csv(here("HW1","IndustryMedians.csv"),header=T)
head(baggage)
```

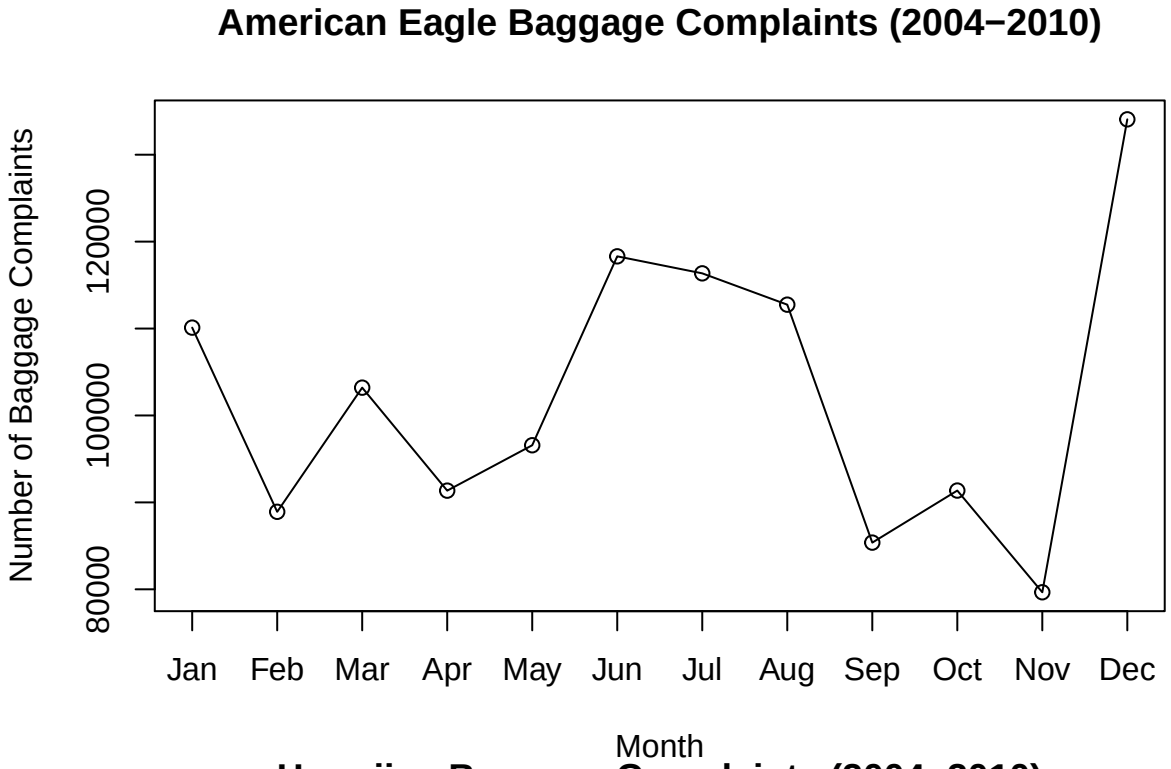
```
##          Airline    Date Month Year Baggage Scheduled Cancelled Enplaned
## 1 American Eagle 01/2004     1 2004   12502     38276      2481   992360
## 2 American Eagle 02/2004     2 2004    8977     35762       886  1060618
## 3 American Eagle 03/2004     3 2004   10289     39445      1346  1227469
## 4 American Eagle 04/2004     4 2004    8095     38982       755  1234451
## 5 American Eagle 05/2004     5 2004   10618     40422      2206  1267581
## 6 American Eagle 06/2004     6 2004   13684     39879      1580  1347303
```

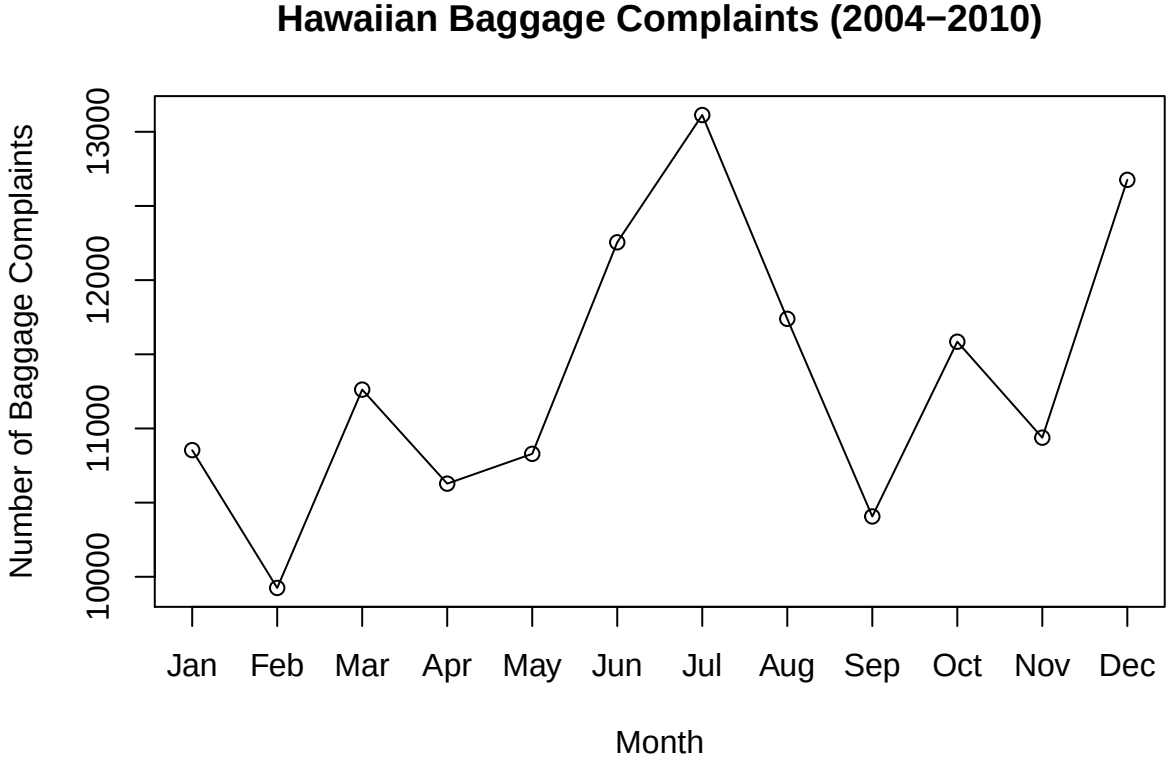
Process data:

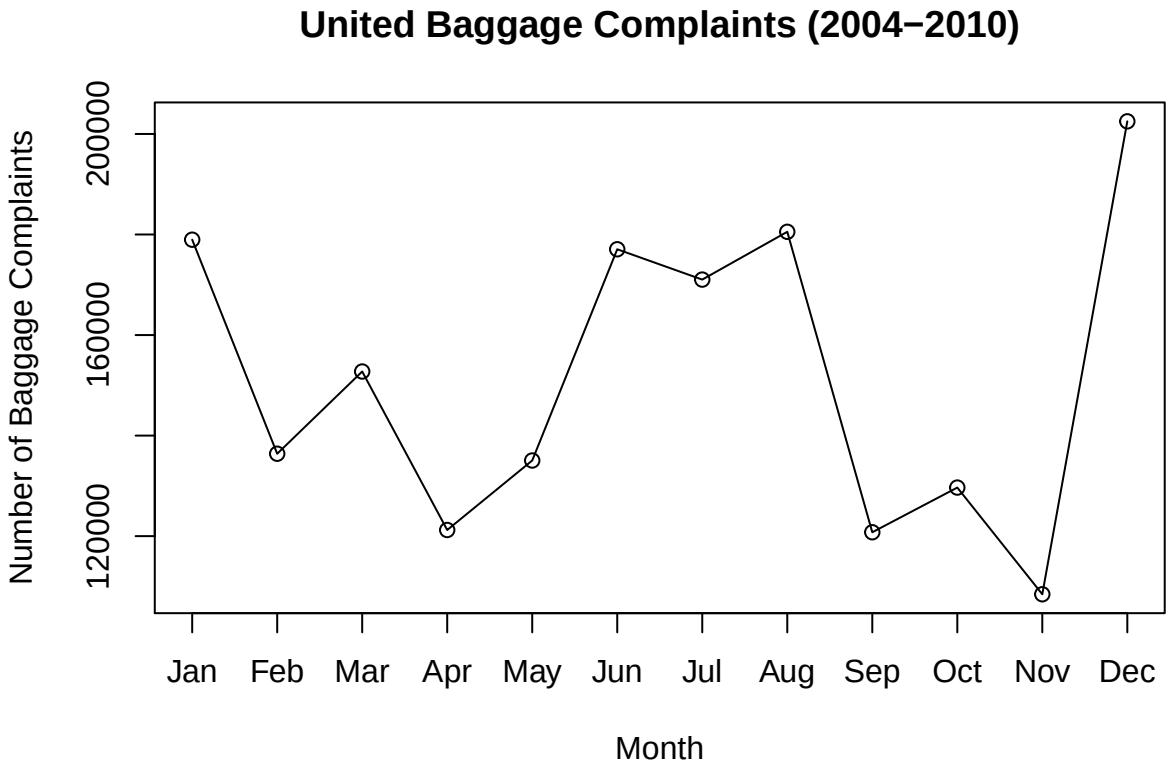
```
baggage$Date = as.Date(paste0("02/",baggage$Date),"%d/%m/%Y")
baggage$Month = factor(baggage$Month,labels=c("Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oc
baggage$Airline = as.character(baggage$Airline)
```

1. Explore baggage complaints over time: create 3 time series plots for the variable *Baggage* by Date for each of the airlines separately.

```
airlines = unique(baggage$Airline)
for(i in 1:length(airlines)){
    airline = airlines[i]
    data = baggage[baggage$Airline == airline,]
    res = aggregate(data["Baggage"], by=list(Month = data$Month), sum)
    plot(x=as.integer(res$Month),y=res$Baggage,type="o",xaxt="n",xlab="Month", ylab="Number of Baggage C
    axis(1,at = seq(1,12),labels = levels(res$Month))
    title(paste(airline,"Baggage Complaints (2004-2010)"))

}
```


American Eagle Baggage Complaints (2004−2010)
Number of Baggage Complaints
80000
100000
120000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Hawaiian Baggage Complaints (2004−2010)
Number of Baggage Complaints
10000
11000
12000
13000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month



2. Briefly describe what patterns you see in the plots

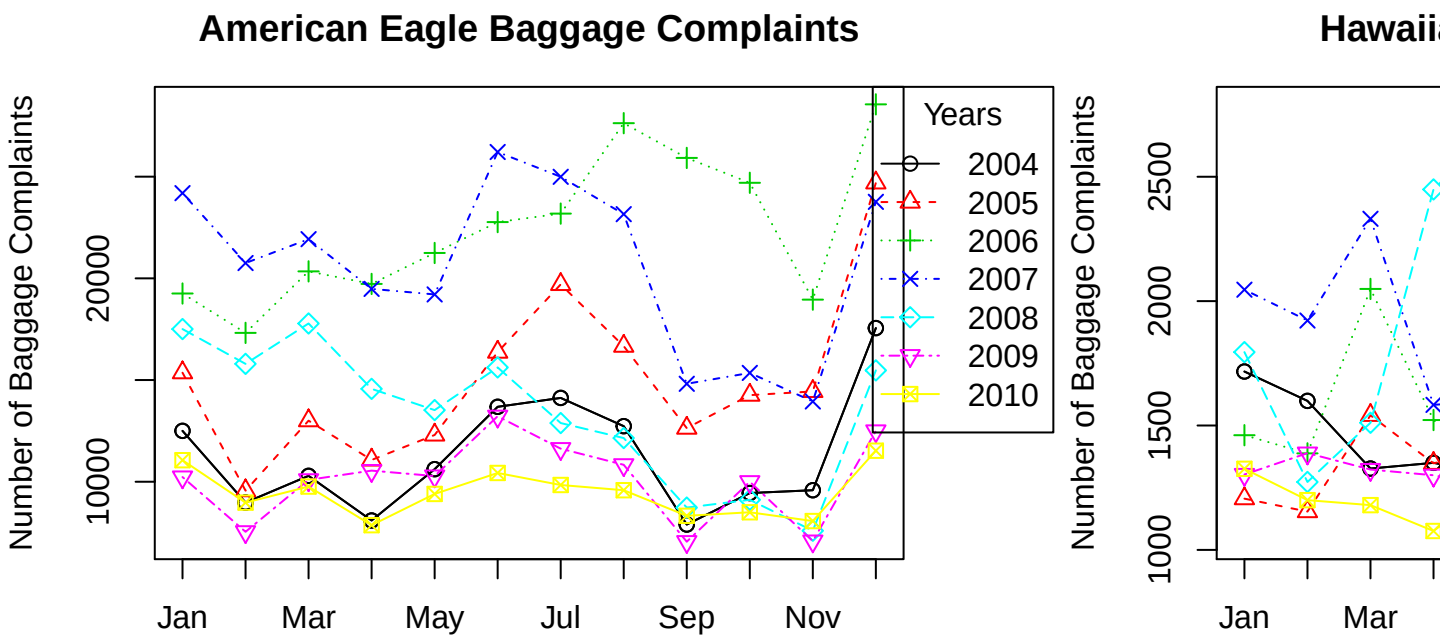
In some of the plots we see a cyclical pattern with the number of baggage complaints increasing during the winter holiday travel season (November-January). There is often another spike in baggage complaints in the summer likely when families are going on summer vacations.

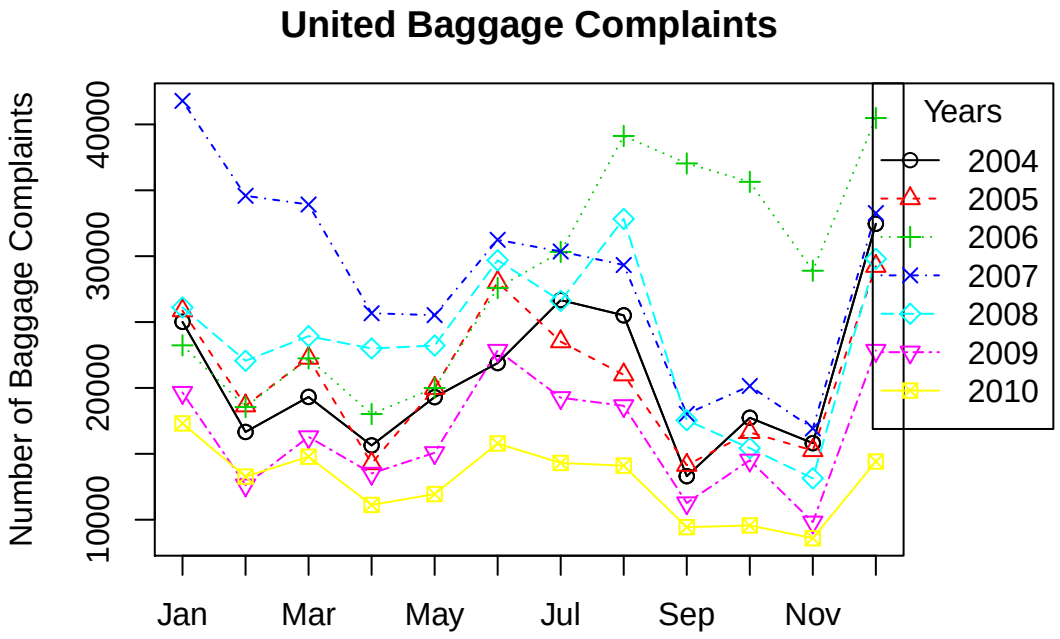
- American Eagle
  - We see that the cyclical yearly trend described above holds for American Eagle. Furthermore we see that there is an increase in the total number of complaints in 2006-2008 and then the number of complaints drops back down from 2009 onward.
- Hawaiian Airlines
  - Compared to American Eagle, Hawaiian Airlines has a smaller number of complaints each month. This is expected because Hawaiian Airlines is a smaller airline compared to American Eagle. Whereas American Eagle had a spike in baggage complaints during the winter holiday travel season, Hawaiian Airlines seems to have spikes in baggage complaints during the Spring and Summer. This perhaps could be because they see an influx of passengers wishing to travel to Hawaii during the Spring and Summer months.
  - The most concerning trend for Hawaiian Airlines is the trend of larger spikes in each of the successive years, culminating with a large spike in baggage complaints during the 2010 holiday season.
- United Airlines
  - Unsurprisingly United Airlines has a larger number of baggage complaints overall which can be explained by its much larger size compared to the other two companies.
  - Like American Eagle we see that United Airlines also experiences a surge in baggage claims during the holiday season. Additionally, it is interesting that both American Eagle and United Airlines have a spike in baggage complaints during 2006. Perhaps there was some external event that caused this for both airlines?
  - Since both American Eagle and United Airlines provide a variety of flights to domestic destinations it is not surprising to see that they have similar baggage complaint patterns in the summer and

winter months.

3.

```
airlines = unique(baggage$Airline)
for(i in 1:length(airlines)){
    airline = airlines[i]
    data = baggage[baggage$Airline == airline,]
    res = aggregate(data["Baggage"], by=list(Month = data$Month, Year = data$Year), sum)
    years = unique(data$Year)
    plot_dat = res[res$Year == years[1],]

    #bottom,left,top,right margin
    par(mar=c(7.1, 4.1, 3.1, 8.9), xpd=TRUE)

    plot(x=as.integer(plot_dat$Month),y=plot_dat$Baggage,type="o",xaxt="n",xlab="", ylab="Number of Bagg
    axis(1,at = seq(1,12),labels = levels(res$Month))
    title(paste(airline,"Baggage Complaints"))
    for(j in 1:length(years)){
        plot_dat = res[res$Year == years[j],]
        lines(x=as.integer(plot_dat$Month),y=plot_dat$Baggage,type="o",lty=j, col=j,pch=j)

    }
    legend("topright", inset=c(-0.2,0), legend=years, pch=1:length(years),lty=1:length(years),col=1:leng


}
```

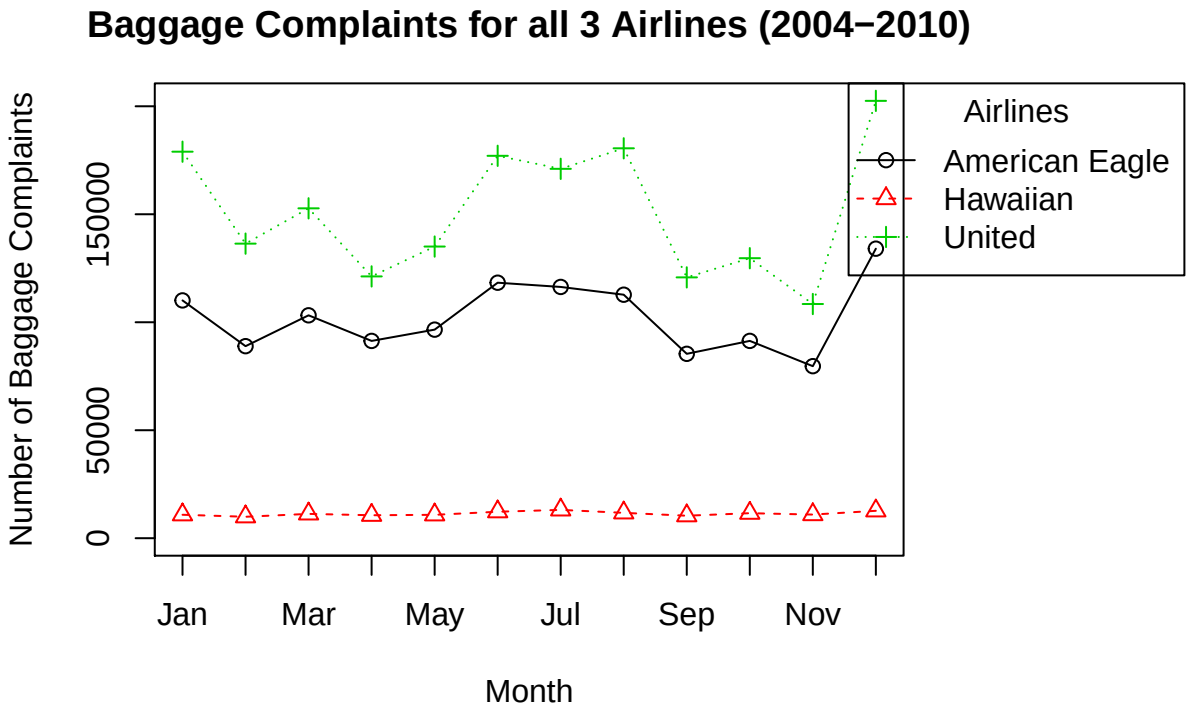




4. Describe the patterns in the plot

5. Plot all three airline Baggage data by Date on one graph.

```
# Maybe do this on the log scale?
airlines = unique(baggage$Airline)
airline = airlines[1]

total_aggregated = aggregate(baggage["Baggage"], by=list(Month = baggage$Month,Airline=baggage$Airline)

data = baggage[baggage$Airline == airline,]
res = aggregate(data["Baggage"], by=list(Month = data$Month), sum)
par(mar=c(7.1, 4.1, 3.1, 8.9), xpd=TRUE)
plot(x=as.integer(res$Month),y=res$Baggage,type="o",xaxt="n",xlab="Month", ylab="Number of Baggage Compl
axis(1,at = seq(1,12),labels = levels(res$Month))
title("Baggage Complaints for all 3 Airlines (2004-2010)")
for(i in 2:length(airlines)){
    airline = airlines[i]
    data = baggage[baggage$Airline == airline,]
    plot_dat = aggregate(data["Baggage"], by=list(Month = data$Month), sum)
    lines(x=as.integer(plot_dat$Month),y=plot_dat$Baggage,type="o",lty=i, col=i,pch=i)
}
legend("topright", inset=c(-0.375,0), legend=airlines, pch=1:length(airlines),lty=1:length(airlines),co
```


Baggage Complaints for all 3 Airlines (2004−2010)
Number of Baggage Complaints
0
50000
150000
Jan
Mar
May
Jul
Sep
Nov
Month
Airlines
American Eagle
Hawaiian
United

6.