**2. R as a calculator:**

> 1+2

[1] 3

> 3^2

[1] 9

#Try built-in functions

> exp(2)-log(100)

[1] 2.783886

# Define a compound function

> sqrt(abs(-2))

[1] 1.414214

> a<-1

> b=2

> (a+b)^2

[1] 9

#Define a function z=f(x,y)

> f<-function(x, y) z<-(y^2-x^2)\*pi

> print(f(1,2))

[1] 9.424778

#See what variables you have

> ls()

[1] "a" "A" "b" "B" "f"

#Remove a and b from working space

> rm(a,b) # Remove all with “rm(list=ls())”

> ls()

[1] "A" "B" "f"

**3. Create Vectors in R:**

> A<-c(2,3,5,7,11)

> B<-seq(100,108, by=2)

> B

[1] 100 102 104 106 108

> c(A,B)

[1] 2 3 5 7 11 100 102 104 106 108

> A+B

[1] 102 105 109 113 119

> airports<-c("JFK","LGA","EWR","SFO")

> length(airports)

[1] 4

> airports[4] #How about airports[-4] ?

[1] "SFO"

> airports[1:3]

[1] "JFK" "LGA" "EWR"

> airports[c(2,4)]

[1] "LGA" "SFO"

**Q1: What are the differences among vector, matrix, data frame, and factor?**

**Your answer should provide a concrete example in codes and annotations.**

A:

**4. Exploratory Analysis:**

p + geom\_point(aes(shape=factor(victory),size=total,colour=factor(victory)))+

+ geom\_text\_repel(aes(colour=factor(year),label=player), position = position\_jitter(width=5, height=1.5) ) + facet\_wrap(~year) + geom\_line(aes(colour=factor(year)))

// added colour by factor

