

# R Notebook

This is an R Markdown Notebook. When you execute code within the notebook, the results appear beneath the code.

Try executing this chunk by clicking the *Run* button within the chunk or by placing your cursor inside it and pressing *Ctrl+Shift+Enter*.

This is the 2nd in series of R Code Files.

Refer the GitHub Repository , for all Code files —> <https://github.com/RohitDhankar/R-Beginners-Online-Virtual-Learning-S>

Its a good practice from time to time to keep a track of our current Working Directory and list out all the Objects in our R ENVIRONMENT - specially so when we are committing changes to a Git Remote.

## VECTOR Operations

```
getwd()
```

```
## [1] "/home/dhankar/Desktop/R_Own/Proj_1"
```

```
#
```

```
ls()
```

```
## character(0)
```

We could remove any object with command - rm("Object Name")

We can also use print() , to view any objects stored value.

```
# Code Section -1
```

```
a1 <- "FINANCE"
```

```
b1 <- "MARKETING"
```

```
c1 <- "SALES"
```

```
d1 <- 3.1416
```

```
char_vector <- c("x","d","c","f")
```

```
print(a1)
```

```
## [1] "FINANCE"
```

```
#
```

```
print(char_vector)
```

```
## [1] "x" "d" "c" "f"
```

```
#
```

Going further with VECTORS .

We combine two or more vectors to get another vector .

```
# Code Section -2
```

```
num_vector <- c(22,22,33,33,44)
```

```
print(num_vector)
```

```
## [1] 22 22 33 33 44
```

```
num_vector1 <- c(11,12,13,14,15)
#
num_vector3 <- c(num_vector,num_vector1)
print(num_vector3)
```

```
## [1] 22 22 33 33 44 11 12 13 14 15
```

Some basic Maths and Stats with VECTORS.

```
# Code Section -3
num_vector3 + 5
```

```
## [1] 27 27 38 38 49 16 17 18 19 20
```

```
# Adds NUMERIC VALUE = 5 to all ELEMENTS of the Num Vector.
```

```
# Code Section -4
```

```
num_vector1 * num_vector3
```

```
## [1] 242 264 429 462 660 121 144 169 196 225
```

```
# First 5 elements of - num_vector3 multiplied by the Five Elements
# of num_vector1 and again the Next 5 elements of num_vector3
# multiplied by the Five Elements of num_vector1
```

Check out the LENGTH of a VECTOR with length()

```
# Code Section -5
```

```
length(num_vector1 * num_vector3)
```

```
## [1] 10
```

```
# Code Section -6
```

```
#num_vector1 %*% num_vector3 # Error in num_vector1 %*% num_vector3 : non-conformable arguments
```

```
# Vectors are not of same Length above - below they are of same length
```

```
nv <- c(1,2,3,4,5)
nv1 <- c(6,7,8,9,10)
```

```
nv %*% nv1 # Inner Product of same Length Vectors
```

```
##      [,1]
## [1,] 130
```

```
# Algebraic Dot Product as defined by WikiPedia - "https://en.wikipedia.org/wiki/Dot_product"
```

Operate upon a ELEMENT of the Vector.

```
# Code Section -7
```

```
log(num_vector3[2]) # Log Base 2 of 22
```

```
## [1] 3.091042
```

```
#
log(22)
```

```
## [1] 3.091042
```

```
#
```

Converting a CHAR Vector into a NUMERIC Vector .

```
# Code Section -8
```

```
ch_v <- c("11","12","13","14","15")
```

```
#
```

```
class(ch_v)
```

```
## [1] "character"
```

```
#ch_v + 2 # Error in ch_v + 2 : non-numeric argument to binary operator
```

```
# Cant do a Math operation on CHAR Vector - lets Convert into NUM Vector
```

```
#
```

```
nm_v <- as.numeric(ch_v)
```

```
#
```

```
class(nm_v)
```

```
## [1] "numeric"
```

```
nm_v + 2
```

```
## [1] 13 14 15 16 17
```

```
#
```

```
#Summary of the Num Vector as below :-
```

```
#
```

```
summary(nm_v+2)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       13      14      15      15      16      17
```

```
#
```

```
summary(nm_v+5)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       16      17      18      18      19      20
```

```
#
```

```
sum(nm_v+5)
```

```
## [1] 90
```

```
#
```

```
sd(nm_v+5)
```

```
## [1] 1.581139
```

```
#
```

```
max(nm_v+5)
```

```
## [1] 20
```

```
#
```

```
min(nm_v+5)
```

```
## [1] 16
```

```

#
mean(nm_v+5)

## [1] 18

#
median(nm_v+5)

## [1] 18

#
#The Quantile -
#
quantile(nm_v+5)

##    0%   25%   50%   75%  100%
##   16   17   18   19   20

#
quantile(nm_v+100)

##    0%   25%   50%   75%  100%
##  111  112  113  114  115

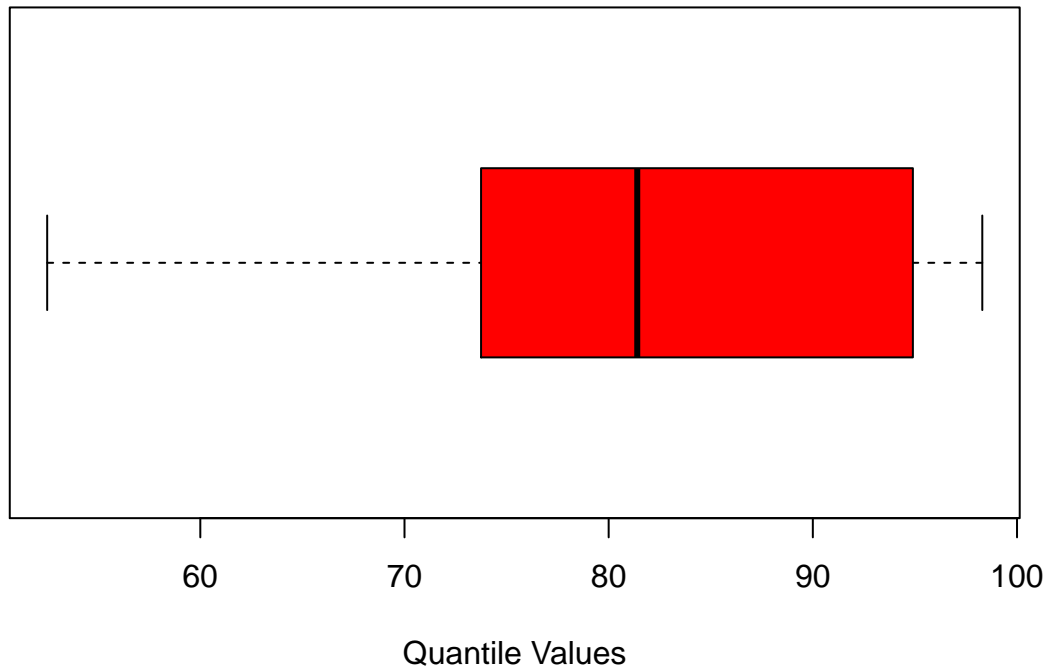
#
#We can also specify the Quantile buckets or Percentiles as an argument to the Quantile function :-
#
nmv_q <- c(10,15,20,25,30,35,40,45,50,55,60,65,70,75,80,85,90,100)
percent_1 <- quantile(nmv_q, c(.50,.75,.84, .97, .99))
percent_1

##    50%   75%   84%   97%   99%
## 52.50 73.75 81.40 94.90 98.30

boxplot(percent_1,col = "red",horizontal = TRUE,
        main = "Box and Whisker Plot of Quantiles",
        xlab = "Quantile Values")

```

## Box and Whisker Plot of Quantiles



*# Kindly note how the ARGUMENTs to boxplot()  
# have been bumped to the next row - keeping in mind  
# the Horizontal space of our PDF knit of the .Rmd file*

*# Seen above we have the MEDIAN quartile - 50% and the UPPER Quartile - 75% along with THREE more percents*

Wiki reference – Percentile Rank - “[https://en.wikipedia.org/wiki/Percentile\\_rank](https://en.wikipedia.org/wiki/Percentile_rank)” #

## Intro to ANOVA and BOXPLOTS

We also carry out ONE Way ANOVA or ANALYSIS of VARIANCE test with the BOX and WHISKERS plots as seen below :-

```
# Code Section -9
library(graphics)

nmv_q <- c(10,15,20,25,30,35,40,45,50,55,60,65,70,75,80,85,90,100)
percent_1 <- quantile(nmv_q, c(.50,.75,.84, .97, .99))
percent_1
```

```
## 50% 75% 84% 97% 99%
## 52.50 73.75 81.40 94.90 98.30
```

```
percent_2 <- quantile(nmv_q, c(.1, .3, .16, .40, .50))
percent_2
```

```
## 10% 30% 16% 40% 50%
## 18.5 35.5 23.6 44.0 52.5
```

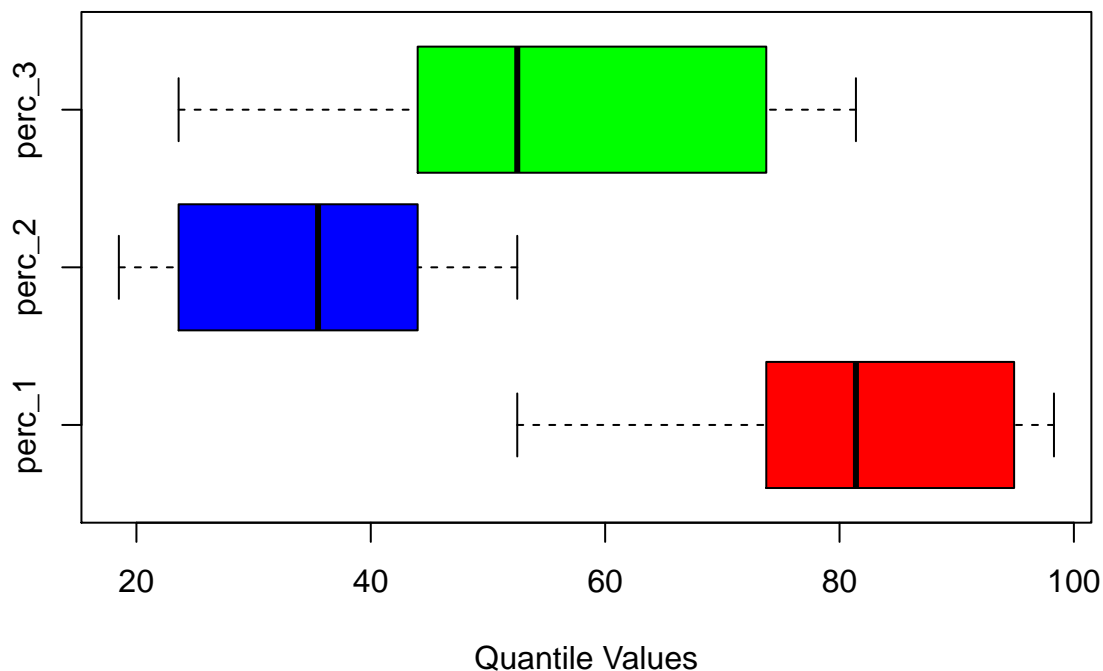
```
percent_3 <- quantile(nmv_q, c(.16, .40, .50,.75,.84))
percent_3

##    16%   40%   50%   75%   84%
## 23.60 44.00 52.50 73.75 81.40

col_boxes = (c("red","blue","green"))

boxplot(percent_1,percent_2,percent_3,col = col_boxes,
        names = c("perc_1","perc_2","perc_3"),horizontal = TRUE,
        main = "Box and Whisker Plot of Quantiles",
        xlab = "Quantile Values")
```

## Box and Whisker Plot of Quantiles



*# Kindly note the Quantiles are randomly chosen here  
 # this is not the best way to choose quantiles  
 # we shall come back for details later in this text*

## rainbow() for Coloring Boxplots -

```
# Code Section -10

percent_4 <- quantile(nmv_q, c(.16, .40, .50,.95,.99))
percent_4

##    16%   40%   50%   95%   99%
## 23.6 44.0 52.5 91.5 98.3

percent_5 <- quantile(nmv_q, c(.16, .24,.32 ,.40,.75))
percent_5
```

```
## 16% 24% 32% 40% 75%
## 23.60 30.40 37.20 44.00 73.75

percent_6 <- quantile(nmv_q, c(.1, .5, .26, .45, .60))
percent_6

## 10% 50% 26% 45% 60%
## 18.50 52.50 32.10 48.25 61.00

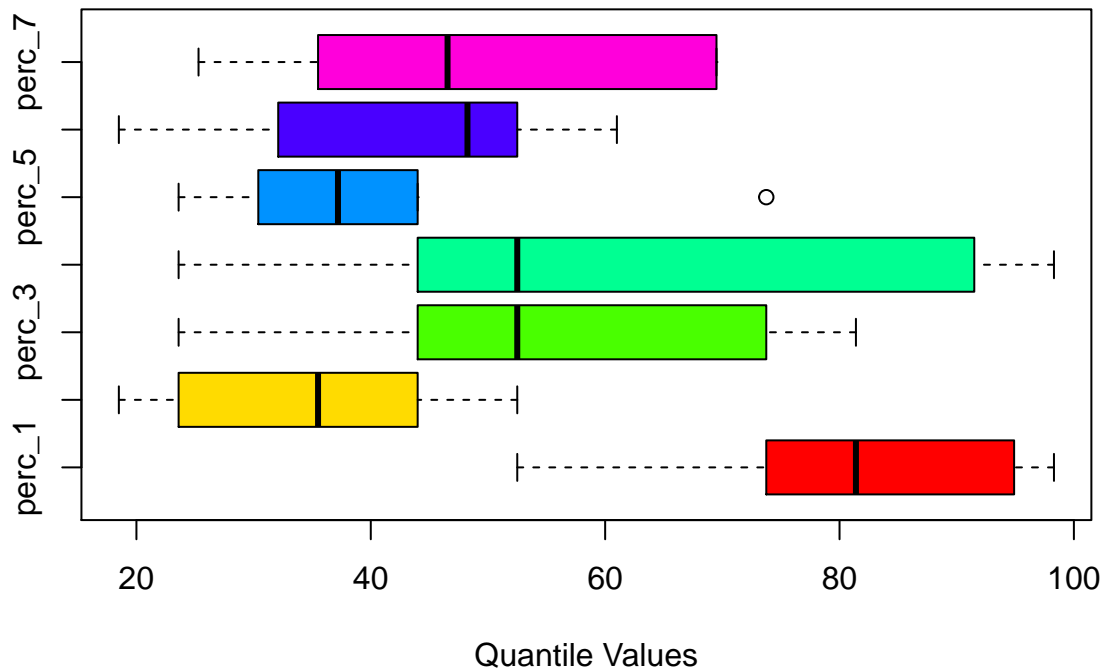
percent_7 <- quantile(nmv_q, c(.3, .7, .18, .43, .70))
percent_7

## 30% 70% 18% 43% 70%
## 35.50 69.50 25.30 46.55 69.50

col_rainbow <- rainbow(7)

boxplot(percent_1,percent_2,percent_3,percent_4,percent_5,percent_6,percent_7,col = col_rainbow,
        names = c("perc_1","perc_2","perc_3","perc_4","perc_5","perc_6","perc_7"),horizontal = TRUE,
        main = "Box and Whisker Plot of Quantiles",
        xlab = "Quantile Values")
```

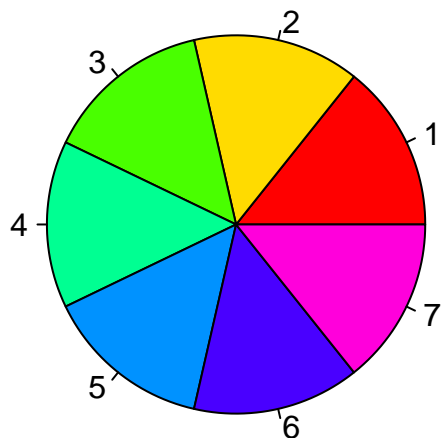
## Box and Whisker Plot of Quantiles



```
# Code Section -11

# Just for Fun a PIE Graph --- you always
# need to avoid PIE Graphs

pie(rep(1, 7), col = rainbow(7))
```



## MATRICE Operations - TRANSPOSE of a MATRIX

Coming back to MATRICES lets further look at some MATRIX Operations :-

*# Code Section -12*

```
m1 <- matrix(data=66:69,nrow=2,ncol=2)
m1
```

```
##      [,1] [,2]
## [1,]   66   68
## [2,]   67   69
```

*# Lets now TRANSPOSE this MATRIX - for more on TRANSPOSE of MATRICES  
# kindly refer this Wiki Link -- <https://en.wikipedia.org/wiki/Transpose>*

```
t(m1)
```

```
##      [,1] [,2]
## [1,]   66   67
## [2,]   68   69
```

*# As seen below - the DIAGONAL Elements remain as -is .  
# 66 and 69 do not move .  
# 67 and 68 switch places , thus giving us a Transpose Matrix.*

*# Lets look at another example of TRANSPOSE ....*

```
m2 <- matrix(data=10:25,nrow=4,ncol=4)
m2
```

```
##      [,1] [,2] [,3] [,4]
## [1,]   10   14   18   22
## [2,]   11   15   19   23
## [3,]   12   16   20   24
## [4,]   13   17   21   25
```

```
class(m2)
```

```
## [1] "matrix"
```



```
## Note in the above sequence - 10:25 - both 10 and 25 are included.
# Lets now TRANSPOSE this MATRIX - for more on TRANSPOSE of MATRICES
# kindly refer this Wiki Link -- https://en.wikipedia.org/wiki/Transpose
```

```
t(m2)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]  10  11  12  13
## [2,]  14  15  16  17
## [3,]  18  19  20  21
## [4,]  22  23  24  25
```

```
# As seen below - the DIAGONAL Elements remain as-is.
# 10, 15 , 20 , 25 -- do not move .
# Non Diagonal elements are Transposed ,giving the Transpose Matrix.
```

## The Semicolon Notation - RANGE or SEQUENCE

```
# Code Section -13
```

```
# Quick recap of the SEQUENCE
```

```
a_seq <- 66:69
a_seq
```

```
## [1] 66 67 68 69
```

```
# In the earlier section we create a MATRIX by using a sequence within the COMBINE function
# We can also use the - seq - sequence function as seen below
```

```
b_seq <- seq(from=66, to=69, by=1)
b_seq
```

```
## [1] 66 67 68 69
```

```
#
```

```
b_seq <- seq(from=66, to=69, by=2)
b_seq
```

```
## [1] 66 68
```

```
#
```

```
c_seq <- seq(from=1, to=10, by=2)
c_seq
```

```
## [1] 1 3 5 7 9
```

```
class(c_seq)
```

```
## [1] "numeric"
```

## The CBIND and RBIND Functions

We can COLUMN Bind and ROW Bind more than one data structures as seen below -

```
# Code Section -14
```

```
ma1 <- matrix(data=10:15,nrow=3,ncol=2)
ma1
```

```
##      [,1] [,2]
## [1,]   10   13
## [2,]   11   14
## [3,]   12   15
```

```
#
class(ma1)
```

```
## [1] "matrix"
```

```
#
ma2 <- matrix(data=20:25,nrow=3,ncol=2)
ma2
```

```
##      [,1] [,2]
## [1,]   20   23
## [2,]   21   24
## [3,]   22   25
```

```
#
class(ma2)
```

```
## [1] "matrix"
```

```
# ROW Bind the Matrices
```

```
ma3 <- rbind(ma1,ma2)
ma3
```

```
##      [,1] [,2]
## [1,]   10   13
## [2,]   11   14
## [3,]   12   15
## [4,]   20   23
## [5,]   21   24
## [6,]   22   25
```

```
#
# COLUMN Bind the Matrices
```

```
ma4 <- cbind(ma1,ma2)
ma4
```

```
##      [,1] [,2] [,3] [,4]
## [1,]   10   13   20   23
## [2,]   11   14   21   24
## [3,]   12   15   22   25
```

```
# As seen below we need to have same COLUMN Numbers to do a RBIND
```

```
#m3 <- rbind(m1,m2)
```

```
# # As seen below we need to have same ROW Numbers to do a RBIND
```

```
#m3 <- cbind(m1,m2)
```

## ROW BIND - Data Frames

*# Code Section -15*

```
df_1 <- read.csv("~/Desktop/R_Own/R_1 - Sheet1.csv",header =TRUE , sep = "," )
df_1
```

##	X.	Product.Name	Prod.ID	Date.of.Invoice	Date.of.Shipping	
## 1	1	OFF-LA-10002782	MX-2014-143658	01-01-2013	02-01-2013	
## 2	2	FUR-FU-10004015	MX-2012-155047	01-01-2013	02-01-2013	
## 3	3	FUR-BO-10002352	MX-2012-155047	01-01-2013	02-01-2013	
## 4	4	OFF-BI-10004428	MX-2012-155047	01-01-2013	02-01-2013	
## 5	5	OFF-AR-10004594	MX-2012-155047	01-01-2013	02-01-2013	
## 6	6	OFF-EN-10001375	MX-2012-155047	01-01-2013	02-01-2013	
## 7	7	OFF-EN-10001375	MX-2013-134096	01-01-2013	02-01-2013	
## 8	8	TEC-MA-10004956	MX-2013-134096	01-01-2013	02-01-2013	
## 9	9	OFF-SU-10003474	MX-2013-134096	01-01-2013	02-01-2013	
## 10	10	TEC-AC-10001830	MX-2013-134096	01-01-2013	02-01-2013	
## 11	11	OFF-BI-10002075	MX-2013-134096	01-01-2013	02-01-2013	
## 12	12	OFF-FA-10002526	MX-2013-156335	01-01-2013	02-01-2013	
## 13	13	FUR-CH-10002846	MX-2013-156335	01-01-2013	02-01-2013	
## 14	14	OFF-EN-10004100	MX-2014-121923	02-01-2013	04-01-2013	
## 15	15	OFF-AR-10003914	MX-2014-135706	02-01-2013	03-01-2013	
## 16	16	OFF-FA-10000038	MX-2014-135706	02-01-2013	03-01-2013	
## 17	17	OFF-EN-10000761	US-2013-126655	02-01-2013	03-01-2013	
## 18	18	FUR-FU-10003066	US-2013-126655	02-01-2013	03-01-2013	
## 19	19	OFF-EN-10000075	US-2013-126655	02-01-2013	03-01-2013	
## 20	20	OFF-EN-10002226	US-2013-126655	02-01-2013	03-01-2013	
## 21	21	FUR-CH-10002132	MX-2013-167759	02-01-2013	04-01-2013	
## 22	22	TEC-AC-10002749	MX-2013-163139	02-01-2013	02-01-2013	
## 23	23	OFF-SU-10000066	MX-2013-163139	02-01-2013	02-01-2013	
## 24	24	OFF-BI-10003934	US-2014-119753	02-01-2013	03-01-2013	
## 25	25	OFF-BI-10003932	US-2012-133970	02-01-2013	03-01-2013	
##		Cost.Price	Quantity	Sales.Price	Shipping.Index	Shipping.Type
## 1		13.080	3	39.240	1	PRIORITY
## 2		252.160	8	2017.280	2	PRIORITY
## 3		193.280	2	386.560	3	PRIORITY
## 4		35.440	4	141.760	4	PRIORITY
## 5		71.600	2	143.200	5	PRIORITY
## 6		56.120	2	112.240	6	PRIORITY
## 7		56.120	2	112.240	7	STANDARD
## 8		344.640	3	1033.920	8	STANDARD
## 9		97.360	4	389.440	9	STANDARD
## 10		341.520	2	683.040	10	STANDARD
## 11		12.060	3	36.180	11	STANDARD
## 12		20.760	3	62.280	12	STANDARD
## 13		210.640	4	842.560	13	STANDARD
## 14		80.100	3	240.300	14	STANDARD
## 15		132.640	4	530.560	15	STANDARD
## 16		12.940	1	12.940	16	STANDARD
## 17		18.840	2	37.280	17	STANDARD
## 18		308.280	7	2157.560	18	STANDARD
## 19		40.176	2	79.952	19	STANDARD

## 20	8.784	3	25.952	20	PRIORITY
## 21	273.472	4	1093.688	21	PRIORITY
## 22	27.000	1	27.000	22	PRIORITY
## 23	207.000	9	1863.000	23	PRIORITY
## 24	60.660	3	181.580	24	PRIORITY
## 25	181.116	9	1629.644	25	PRIORITY

```
##      Category
## 1 Office Supplies
## 2      Furniture
## 3      Furniture
## 4 Office Supplies
## 5 Office Supplies
## 6 Office Supplies
## 7 Office Supplies
## 8      Technology
## 9 Office Supplies
## 10     Technology
## 11 Office Supplies
## 12 Office Supplies
## 13      Furniture
## 14 Office Supplies
## 15 Office Supplies
## 16 Office Supplies
## 17 Office Supplies
## 18      Furniture
## 19 Office Supplies
## 20 Office Supplies
## 21      Furniture
## 22      Technology
## 23 Office Supplies
## 24 Office Supplies
## 25 Office Supplies
```

*# Code Section -16*

```
df_2 <- read.csv("~/Desktop/R_Own/R_2.csv",header =TRUE , sep = "," )
df_2
```

##	X.	Product.Name	Prod.ID	Date.of.Invoice	Date.of.Shipping
## 1	1	TEC-AC-10001830	MX-2013-134096	05-01-2013	06-01-2013
## 2	2	FUR-FU-10004015	MX-2012-155047	03-01-2013	03-01-2013
## 3	3	FUR-B0-10002352	MX-2012-155047	03-01-2013	03-01-2013
## 4	4	OFF-BI-10004428	MX-2012-155047	03-01-2013	03-01-2013
## 5	5	OFF-AR-10004594	MX-2012-155047	03-01-2013	03-01-2013
## 6	6	OFF-EN-10001375	MX-2012-155047	03-01-2013	03-01-2013
## 7	7	OFF-EN-10001375	MX-2013-134096	03-01-2013	04-01-2013
## 8	8	OFF-AR-10003914	MX-2014-135706	03-01-2013	04-01-2013
## 9	9	OFF-FA-10000038	MX-2014-135706	03-01-2013	04-01-2013
## 10	10	OFF-EN-10000761	US-2013-126655	03-01-2013	04-01-2013
## 11	11	FUR-FU-10003066	US-2013-126655	03-01-2013	04-01-2013
## 12	12	OFF-EN-10000075	US-2013-126655	03-01-2013	04-01-2013
## 13	13	OFF-EN-10002226	US-2013-126655	03-01-2013	03-01-2013
## 14	14	FUR-CH-10002132	MX-2013-167759	03-01-2013	03-01-2013
## 15	15	OFF-EN-10001375	MX-2013-134096	03-01-2013	04-01-2013
## 16	16	TEC-MA-10004956	MX-2013-134096	03-01-2013	04-01-2013

## 17	17	OFF-SU-10003474	MX-2013-134096	03-01-2013	04-01-2013	
## 18	18	TEC-AC-10001830	MX-2013-134096	03-01-2013	04-01-2013	
## 19	19	OFF-BI-10002075	MX-2013-134096	03-01-2013	04-01-2013	
## 20	20	OFF-FA-10002526	MX-2013-156335	03-01-2013	04-01-2013	
## 21	21	OFF-EN-10001375	MX-2013-134096	04-01-2013	05-01-2013	
## 22	22	TEC-MA-10004956	MX-2013-134096	04-01-2013	05-01-2013	
## 23	23	OFF-SU-10003474	MX-2013-134096	04-01-2013	05-01-2013	
## 24	24	TEC-AC-10001830	MX-2013-134096	04-01-2013	05-01-2013	
## 25	25	OFF-BI-10002075	MX-2013-134096	04-01-2013	05-01-2013	
## 26	26	OFF-EN-10001375	MX-2013-134096	04-01-2013	05-01-2013	
## 27	27	TEC-MA-10004956	MX-2013-134096	04-01-2013	05-01-2013	
## 28	28	OFF-SU-10003474	MX-2013-134096	04-01-2013	05-01-2013	
## 29	29	TEC-AC-10001830	MX-2013-134096	04-01-2013	05-01-2013	
## 30	30	OFF-BI-10002075	MX-2013-134096	04-01-2013	05-01-2013	
## 31	31	OFF-EN-10000761	US-2013-126655	04-01-2013	05-01-2013	
## 32	32	FUR-FU-10003066	US-2013-126655	04-01-2013	05-01-2013	
## 33	33	OFF-EN-10000075	US-2013-126655	04-01-2013	05-01-2013	
## 34	34	OFF-EN-10002226	US-2013-126655	04-01-2013	04-01-2013	
## 35	35	FUR-CH-10002132	MX-2013-167759	04-01-2013	04-01-2013	
## 36	36	OFF-EN-10001375	MX-2013-134096	04-01-2013	05-01-2013	
## 37	37	TEC-MA-10004956	MX-2013-134096	04-01-2013	05-01-2013	
## 38	38	OFF-SU-10003474	MX-2013-134096	04-01-2013	05-01-2013	
## 39	39	TEC-AC-10001830	MX-2013-134096	04-01-2013	05-01-2013	
## 40	40	OFF-BI-10002075	MX-2013-134096	04-01-2013	05-01-2013	
## 41	41	OFF-FA-10002526	MX-2013-156335	04-01-2013	05-01-2013	
## 42	42	OFF-EN-10001375	MX-2013-134096	04-01-2013	05-01-2013	
## 43	43	TEC-MA-10004956	MX-2013-134096	04-01-2013	05-01-2013	
## 44	44	OFF-SU-10003474	MX-2013-134096	05-01-2013	06-01-2013	
## 45	45	TEC-AC-10001830	MX-2013-134096	05-01-2013	06-01-2013	
## 46	46	OFF-BI-10002075	MX-2013-134096	05-01-2013	06-01-2013	
## 47	47	OFF-EN-10001375	MX-2013-134096	05-01-2013	06-01-2013	
## 48	48	TEC-MA-10004956	MX-2013-134096	05-01-2013	06-01-2013	
## 49	49	OFF-SU-10003474	MX-2013-134096	05-01-2013	06-01-2013	
## 50	50	OFF-LA-10002782	MX-2014-143658	03-01-2013	03-01-2013	
##		Cost.Price	Quantity	Sales.Price	Shipping.Index	Shipping.Type
## 1		341.520	2	683.040	10	STANDARD
## 2		252.160	8	2017.280	2	PRIORITY
## 3		193.280	2	386.560	3	PRIORITY
## 4		35.440	4	141.760	4	PRIORITY
## 5		71.600	2	143.200	5	PRIORITY
## 6		56.120	2	112.240	6	PRIORITY
## 7		56.120	2	112.240	7	STANDARD
## 8		132.640	4	530.560	15	STANDARD
## 9		12.940	1	12.940	16	STANDARD
## 10		18.840	2	37.280	17	STANDARD
## 11		308.280	7	2157.560	18	STANDARD
## 12		40.176	2	79.952	19	STANDARD
## 13		8.784	3	25.952	20	PRIORITY
## 14		273.472	4	1093.688	21	PRIORITY
## 15		56.120	2	112.240	7	STANDARD
## 16		344.640	3	1033.920	8	STANDARD
## 17		97.360	4	389.440	9	STANDARD
## 18		341.520	2	683.040	10	STANDARD
## 19		12.060	3	36.180	11	STANDARD

## 20	20.760	3	62.280	12	STANDARD
## 21	56.120	2	112.240	7	STANDARD
## 22	344.640	3	1033.920	8	STANDARD
## 23	97.360	4	389.440	9	STANDARD
## 24	341.520	2	683.040	10	STANDARD
## 25	12.060	3	36.180	11	STANDARD
## 26	56.120	2	112.240	7	STANDARD
## 27	344.640	3	1033.920	8	STANDARD
## 28	97.360	4	389.440	9	STANDARD
## 29	341.520	2	683.040	10	STANDARD
## 30	12.060	3	36.180	11	STANDARD
## 31	18.840	2	37.280	17	STANDARD
## 32	308.280	7	2157.560	18	STANDARD
## 33	40.176	2	79.952	19	STANDARD
## 34	8.784	3	25.952	20	PRIORITY
## 35	273.472	4	1093.688	21	PRIORITY
## 36	56.120	2	112.240	7	STANDARD
## 37	344.640	3	1033.920	8	STANDARD
## 38	97.360	4	389.440	9	STANDARD
## 39	341.520	2	683.040	10	STANDARD
## 40	12.060	3	36.180	11	STANDARD
## 41	20.760	3	62.280	12	STANDARD
## 42	56.120	2	112.240	7	STANDARD
## 43	344.640	3	1033.920	8	STANDARD
## 44	97.360	4	389.440	9	STANDARD
## 45	341.520	2	683.040	10	STANDARD
## 46	12.060	3	36.180	11	STANDARD
## 47	56.120	2	112.240	7	STANDARD
## 48	344.640	3	1033.920	8	STANDARD
## 49	97.360	4	389.440	9	STANDARD
## 50	13.080	3	39.240	1	PRIORITY
##	Category				
## 1	Technology				
## 2	Furniture				
## 3	Furniture				
## 4	Office Supplies				
## 5	Office Supplies				
## 6	Office Supplies				
## 7	Office Supplies				
## 8	Office Supplies				
## 9	Office Supplies				
## 10	Office Supplies				
## 11	Furniture				
## 12	Office Supplies				
## 13	Office Supplies				
## 14	Furniture				
## 15	Office Supplies				
## 16	Technology				
## 17	Office Supplies				
## 18	Technology				
## 19	Office Supplies				
## 20	Office Supplies				
## 21	Office Supplies				
## 22	Technology				

```
## 23 Office Supplies
## 24      Technology
## 25 Office Supplies
## 26 Office Supplies
## 27      Technology
## 28 Office Supplies
## 29      Technology
## 30 Office Supplies
## 31 Office Supplies
## 32      Furniture
## 33 Office Supplies
## 34 Office Supplies
## 35      Furniture
## 36 Office Supplies
## 37      Technology
## 38 Office Supplies
## 39      Technology
## 40 Office Supplies
## 41 Office Supplies
## 42 Office Supplies
## 43      Technology
## 44 Office Supplies
## 45      Technology
## 46 Office Supplies
## 47 Office Supplies
## 48      Technology
## 49 Office Supplies
## 50 Office Supplies
```

## COLUMN BIND- Data Frame

*# Code Section -17*

```
df_3_C <- cbind(df_1,df_2)
df_3_C
```

##	X.	Product.Name	Prod.ID	Date.of.Invoice	Date.of.Shipping
## 1	1	OFF-LA-10002782	MX-2014-143658	01-01-2013	02-01-2013
## 2	2	FUR-FU-10004015	MX-2012-155047	01-01-2013	02-01-2013
## 3	3	FUR-BO-10002352	MX-2012-155047	01-01-2013	02-01-2013
## 4	4	OFF-BI-10004428	MX-2012-155047	01-01-2013	02-01-2013
## 5	5	OFF-AR-10004594	MX-2012-155047	01-01-2013	02-01-2013
## 6	6	OFF-EN-10001375	MX-2012-155047	01-01-2013	02-01-2013
## 7	7	OFF-EN-10001375	MX-2013-134096	01-01-2013	02-01-2013
## 8	8	TEC-MA-10004956	MX-2013-134096	01-01-2013	02-01-2013
## 9	9	OFF-SU-10003474	MX-2013-134096	01-01-2013	02-01-2013
## 10	10	TEC-AC-10001830	MX-2013-134096	01-01-2013	02-01-2013
## 11	11	OFF-BI-10002075	MX-2013-134096	01-01-2013	02-01-2013
## 12	12	OFF-FA-10002526	MX-2013-156335	01-01-2013	02-01-2013
## 13	13	FUR-CH-10002846	MX-2013-156335	01-01-2013	02-01-2013
## 14	14	OFF-EN-10004100	MX-2014-121923	02-01-2013	04-01-2013
## 15	15	OFF-AR-10003914	MX-2014-135706	02-01-2013	03-01-2013

## 16	16	OFF-FA-10000038	MX-2014-135706	02-01-2013	03-01-2013	
## 17	17	OFF-EN-10000761	US-2013-126655	02-01-2013	03-01-2013	
## 18	18	FUR-FU-10003066	US-2013-126655	02-01-2013	03-01-2013	
## 19	19	OFF-EN-10000075	US-2013-126655	02-01-2013	03-01-2013	
## 20	20	OFF-EN-10002226	US-2013-126655	02-01-2013	03-01-2013	
## 21	21	FUR-CH-10002132	MX-2013-167759	02-01-2013	04-01-2013	
## 22	22	TEC-AC-10002749	MX-2013-163139	02-01-2013	02-01-2013	
## 23	23	OFF-SU-10000066	MX-2013-163139	02-01-2013	02-01-2013	
## 24	24	OFF-BI-10003934	US-2014-119753	02-01-2013	03-01-2013	
## 25	25	OFF-BI-10003932	US-2012-133970	02-01-2013	03-01-2013	
## 26	1	OFF-LA-10002782	MX-2014-143658	01-01-2013	02-01-2013	
## 27	2	FUR-FU-10004015	MX-2012-155047	01-01-2013	02-01-2013	
## 28	3	FUR-BO-10002352	MX-2012-155047	01-01-2013	02-01-2013	
## 29	4	OFF-BI-10004428	MX-2012-155047	01-01-2013	02-01-2013	
## 30	5	OFF-AR-10004594	MX-2012-155047	01-01-2013	02-01-2013	
## 31	6	OFF-EN-10001375	MX-2012-155047	01-01-2013	02-01-2013	
## 32	7	OFF-EN-10001375	MX-2013-134096	01-01-2013	02-01-2013	
## 33	8	TEC-MA-10004956	MX-2013-134096	01-01-2013	02-01-2013	
## 34	9	OFF-SU-10003474	MX-2013-134096	01-01-2013	02-01-2013	
## 35	10	TEC-AC-10001830	MX-2013-134096	01-01-2013	02-01-2013	
## 36	11	OFF-BI-10002075	MX-2013-134096	01-01-2013	02-01-2013	
## 37	12	OFF-FA-10002526	MX-2013-156335	01-01-2013	02-01-2013	
## 38	13	FUR-CH-10002846	MX-2013-156335	01-01-2013	02-01-2013	
## 39	14	OFF-EN-10004100	MX-2014-121923	02-01-2013	04-01-2013	
## 40	15	OFF-AR-10003914	MX-2014-135706	02-01-2013	03-01-2013	
## 41	16	OFF-FA-10000038	MX-2014-135706	02-01-2013	03-01-2013	
## 42	17	OFF-EN-10000761	US-2013-126655	02-01-2013	03-01-2013	
## 43	18	FUR-FU-10003066	US-2013-126655	02-01-2013	03-01-2013	
## 44	19	OFF-EN-10000075	US-2013-126655	02-01-2013	03-01-2013	
## 45	20	OFF-EN-10002226	US-2013-126655	02-01-2013	03-01-2013	
## 46	21	FUR-CH-10002132	MX-2013-167759	02-01-2013	04-01-2013	
## 47	22	TEC-AC-10002749	MX-2013-163139	02-01-2013	02-01-2013	
## 48	23	OFF-SU-10000066	MX-2013-163139	02-01-2013	02-01-2013	
## 49	24	OFF-BI-10003934	US-2014-119753	02-01-2013	03-01-2013	
## 50	25	OFF-BI-10003932	US-2012-133970	02-01-2013	03-01-2013	
##		Cost.Price	Quantity	Sales.Price	Shipping.Index	Shipping.Type
## 1		13.080	3	39.240	1	PRIORITY
## 2		252.160	8	2017.280	2	PRIORITY
## 3		193.280	2	386.560	3	PRIORITY
## 4		35.440	4	141.760	4	PRIORITY
## 5		71.600	2	143.200	5	PRIORITY
## 6		56.120	2	112.240	6	PRIORITY
## 7		56.120	2	112.240	7	STANDARD
## 8		344.640	3	1033.920	8	STANDARD
## 9		97.360	4	389.440	9	STANDARD
## 10		341.520	2	683.040	10	STANDARD
## 11		12.060	3	36.180	11	STANDARD
## 12		20.760	3	62.280	12	STANDARD
## 13		210.640	4	842.560	13	STANDARD
## 14		80.100	3	240.300	14	STANDARD
## 15		132.640	4	530.560	15	STANDARD
## 16		12.940	1	12.940	16	STANDARD
## 17		18.840	2	37.280	17	STANDARD
## 18		308.280	7	2157.560	18	STANDARD



## 19	40.176	2	79.952	19	STANDARD
## 20	8.784	3	25.952	20	PRIORITY
## 21	273.472	4	1093.688	21	PRIORITY
## 22	27.000	1	27.000	22	PRIORITY
## 23	207.000	9	1863.000	23	PRIORITY
## 24	60.660	3	181.580	24	PRIORITY
## 25	181.116	9	1629.644	25	PRIORITY
## 26	13.080	3	39.240	1	PRIORITY
## 27	252.160	8	2017.280	2	PRIORITY
## 28	193.280	2	386.560	3	PRIORITY
## 29	35.440	4	141.760	4	PRIORITY
## 30	71.600	2	143.200	5	PRIORITY
## 31	56.120	2	112.240	6	PRIORITY
## 32	56.120	2	112.240	7	STANDARD
## 33	344.640	3	1033.920	8	STANDARD
## 34	97.360	4	389.440	9	STANDARD
## 35	341.520	2	683.040	10	STANDARD
## 36	12.060	3	36.180	11	STANDARD
## 37	20.760	3	62.280	12	STANDARD
## 38	210.640	4	842.560	13	STANDARD
## 39	80.100	3	240.300	14	STANDARD
## 40	132.640	4	530.560	15	STANDARD
## 41	12.940	1	12.940	16	STANDARD
## 42	18.840	2	37.280	17	STANDARD
## 43	308.280	7	2157.560	18	STANDARD
## 44	40.176	2	79.952	19	STANDARD
## 45	8.784	3	25.952	20	PRIORITY
## 46	273.472	4	1093.688	21	PRIORITY
## 47	27.000	1	27.000	22	PRIORITY
## 48	207.000	9	1863.000	23	PRIORITY
## 49	60.660	3	181.580	24	PRIORITY
## 50	181.116	9	1629.644	25	PRIORITY
##	Category X.	Product.Name	Prod.ID	Date.of.Invoice	
## 1	Office Supplies	1 TEC-AC-10001830	MX-2013-134096	05-01-2013	
## 2	Furniture	2 FUR-FU-10004015	MX-2012-155047	03-01-2013	
## 3	Furniture	3 FUR-BO-10002352	MX-2012-155047	03-01-2013	
## 4	Office Supplies	4 OFF-BI-10004428	MX-2012-155047	03-01-2013	
## 5	Office Supplies	5 OFF-AR-10004594	MX-2012-155047	03-01-2013	
## 6	Office Supplies	6 OFF-EN-10001375	MX-2012-155047	03-01-2013	
## 7	Office Supplies	7 OFF-EN-10001375	MX-2013-134096	03-01-2013	
## 8	Technology	8 OFF-AR-10003914	MX-2014-135706	03-01-2013	
## 9	Office Supplies	9 OFF-FA-10000038	MX-2014-135706	03-01-2013	
## 10	Technology	10 OFF-EN-10000761	US-2013-126655	03-01-2013	
## 11	Office Supplies	11 FUR-FU-10003066	US-2013-126655	03-01-2013	
## 12	Office Supplies	12 OFF-EN-10000075	US-2013-126655	03-01-2013	
## 13	Furniture	13 OFF-EN-10002226	US-2013-126655	03-01-2013	
## 14	Office Supplies	14 FUR-CH-10002132	MX-2013-167759	03-01-2013	
## 15	Office Supplies	15 OFF-EN-10001375	MX-2013-134096	03-01-2013	
## 16	Office Supplies	16 TEC-MA-10004956	MX-2013-134096	03-01-2013	
## 17	Office Supplies	17 OFF-SU-10003474	MX-2013-134096	03-01-2013	
## 18	Furniture	18 TEC-AC-10001830	MX-2013-134096	03-01-2013	
## 19	Office Supplies	19 OFF-BI-10002075	MX-2013-134096	03-01-2013	
## 20	Office Supplies	20 OFF-FA-10002526	MX-2013-156335	03-01-2013	
## 21	Furniture	21 OFF-EN-10001375	MX-2013-134096	04-01-2013	

## 22	Technology	22	TEC-MA-10004956	MX-2013-134096	04-01-2013
## 23	Office Supplies	23	OFF-SU-10003474	MX-2013-134096	04-01-2013
## 24	Office Supplies	24	TEC-AC-10001830	MX-2013-134096	04-01-2013
## 25	Office Supplies	25	OFF-BI-10002075	MX-2013-134096	04-01-2013
## 26	Office Supplies	26	OFF-EN-10001375	MX-2013-134096	04-01-2013
## 27	Furniture	27	TEC-MA-10004956	MX-2013-134096	04-01-2013
## 28	Furniture	28	OFF-SU-10003474	MX-2013-134096	04-01-2013
## 29	Office Supplies	29	TEC-AC-10001830	MX-2013-134096	04-01-2013
## 30	Office Supplies	30	OFF-BI-10002075	MX-2013-134096	04-01-2013
## 31	Office Supplies	31	OFF-EN-10000761	US-2013-126655	04-01-2013
## 32	Office Supplies	32	FUR-FU-10003066	US-2013-126655	04-01-2013
## 33	Technology	33	OFF-EN-10000075	US-2013-126655	04-01-2013
## 34	Office Supplies	34	OFF-EN-10002226	US-2013-126655	04-01-2013
## 35	Technology	35	FUR-CH-10002132	MX-2013-167759	04-01-2013
## 36	Office Supplies	36	OFF-EN-10001375	MX-2013-134096	04-01-2013
## 37	Office Supplies	37	TEC-MA-10004956	MX-2013-134096	04-01-2013
## 38	Furniture	38	OFF-SU-10003474	MX-2013-134096	04-01-2013
## 39	Office Supplies	39	TEC-AC-10001830	MX-2013-134096	04-01-2013
## 40	Office Supplies	40	OFF-BI-10002075	MX-2013-134096	04-01-2013
## 41	Office Supplies	41	OFF-FA-10002526	MX-2013-156335	04-01-2013
## 42	Office Supplies	42	OFF-EN-10001375	MX-2013-134096	04-01-2013
## 43	Furniture	43	TEC-MA-10004956	MX-2013-134096	04-01-2013
## 44	Office Supplies	44	OFF-SU-10003474	MX-2013-134096	05-01-2013
## 45	Office Supplies	45	TEC-AC-10001830	MX-2013-134096	05-01-2013
## 46	Furniture	46	OFF-BI-10002075	MX-2013-134096	05-01-2013
## 47	Technology	47	OFF-EN-10001375	MX-2013-134096	05-01-2013
## 48	Office Supplies	48	TEC-MA-10004956	MX-2013-134096	05-01-2013
## 49	Office Supplies	49	OFF-SU-10003474	MX-2013-134096	05-01-2013
## 50	Office Supplies	50	OFF-LA-10002782	MX-2014-143658	03-01-2013
##	Date.of.Shipping	Cost.Price	Quantity	Sales.Price	Shipping.Index
## 1	06-01-2013	341.520	2	683.040	10
## 2	03-01-2013	252.160	8	2017.280	2
## 3	03-01-2013	193.280	2	386.560	3
## 4	03-01-2013	35.440	4	141.760	4
## 5	03-01-2013	71.600	2	143.200	5
## 6	03-01-2013	56.120	2	112.240	6
## 7	04-01-2013	56.120	2	112.240	7
## 8	04-01-2013	132.640	4	530.560	15
## 9	04-01-2013	12.940	1	12.940	16
## 10	04-01-2013	18.840	2	37.280	17
## 11	04-01-2013	308.280	7	2157.560	18
## 12	04-01-2013	40.176	2	79.952	19
## 13	03-01-2013	8.784	3	25.952	20
## 14	03-01-2013	273.472	4	1093.688	21
## 15	04-01-2013	56.120	2	112.240	7
## 16	04-01-2013	344.640	3	1033.920	8
## 17	04-01-2013	97.360	4	389.440	9
## 18	04-01-2013	341.520	2	683.040	10
## 19	04-01-2013	12.060	3	36.180	11
## 20	04-01-2013	20.760	3	62.280	12
## 21	05-01-2013	56.120	2	112.240	7
## 22	05-01-2013	344.640	3	1033.920	8
## 23	05-01-2013	97.360	4	389.440	9
## 24	05-01-2013	341.520	2	683.040	10

## 25	05-01-2013	12.060	3	36.180	11
## 26	05-01-2013	56.120	2	112.240	7
## 27	05-01-2013	344.640	3	1033.920	8
## 28	05-01-2013	97.360	4	389.440	9
## 29	05-01-2013	341.520	2	683.040	10
## 30	05-01-2013	12.060	3	36.180	11
## 31	05-01-2013	18.840	2	37.280	17
## 32	05-01-2013	308.280	7	2157.560	18
## 33	05-01-2013	40.176	2	79.952	19
## 34	04-01-2013	8.784	3	25.952	20
## 35	04-01-2013	273.472	4	1093.688	21
## 36	05-01-2013	56.120	2	112.240	7
## 37	05-01-2013	344.640	3	1033.920	8
## 38	05-01-2013	97.360	4	389.440	9
## 39	05-01-2013	341.520	2	683.040	10
## 40	05-01-2013	12.060	3	36.180	11
## 41	05-01-2013	20.760	3	62.280	12
## 42	05-01-2013	56.120	2	112.240	7
## 43	05-01-2013	344.640	3	1033.920	8
## 44	06-01-2013	97.360	4	389.440	9
## 45	06-01-2013	341.520	2	683.040	10
## 46	06-01-2013	12.060	3	36.180	11
## 47	06-01-2013	56.120	2	112.240	7
## 48	06-01-2013	344.640	3	1033.920	8
## 49	06-01-2013	97.360	4	389.440	9
## 50	03-01-2013	13.080	3	39.240	1
##	Shipping.Type	Category			
## 1	STANDARD	Technology			
## 2	PRIORITY	Furniture			
## 3	PRIORITY	Furniture			
## 4	PRIORITY	Office Supplies			
## 5	PRIORITY	Office Supplies			
## 6	PRIORITY	Office Supplies			
## 7	STANDARD	Office Supplies			
## 8	STANDARD	Office Supplies			
## 9	STANDARD	Office Supplies			
## 10	STANDARD	Office Supplies			
## 11	STANDARD	Furniture			
## 12	STANDARD	Office Supplies			
## 13	PRIORITY	Office Supplies			
## 14	PRIORITY	Furniture			
## 15	STANDARD	Office Supplies			
## 16	STANDARD	Technology			
## 17	STANDARD	Office Supplies			
## 18	STANDARD	Technology			
## 19	STANDARD	Office Supplies			
## 20	STANDARD	Office Supplies			
## 21	STANDARD	Office Supplies			
## 22	STANDARD	Technology			
## 23	STANDARD	Office Supplies			
## 24	STANDARD	Technology			
## 25	STANDARD	Office Supplies			
## 26	STANDARD	Office Supplies			
## 27	STANDARD	Technology			

```
## 28      STANDARD Office Supplies
## 29      STANDARD      Technology
## 30      STANDARD Office Supplies
## 31      STANDARD Office Supplies
## 32      STANDARD      Furniture
## 33      STANDARD Office Supplies
## 34      PRIORITY Office Supplies
## 35      PRIORITY      Furniture
## 36      STANDARD Office Supplies
## 37      STANDARD      Technology
## 38      STANDARD Office Supplies
## 39      STANDARD      Technology
## 40      STANDARD Office Supplies
## 41      STANDARD Office Supplies
## 42      STANDARD Office Supplies
## 43      STANDARD      Technology
## 44      STANDARD Office Supplies
## 45      STANDARD      Technology
## 46      STANDARD Office Supplies
## 47      STANDARD Office Supplies
## 48      STANDARD      Technology
## 49      STANDARD Office Supplies
## 50      PRIORITY Office Supplies
```

## ROW BIND - Data Frame

*# Code Section -18*

```
df_3_R <- rbind(df_2,df_1)
df_3_R
```

##	X.	Product.Name	Prod.ID	Date.of.Invoice	Date.of.Shipping
## 1	1	TEC-AC-10001830	MX-2013-134096	05-01-2013	06-01-2013
## 2	2	FUR-FU-10004015	MX-2012-155047	03-01-2013	03-01-2013
## 3	3	FUR-BO-10002352	MX-2012-155047	03-01-2013	03-01-2013
## 4	4	OFF-BI-10004428	MX-2012-155047	03-01-2013	03-01-2013
## 5	5	OFF-AR-10004594	MX-2012-155047	03-01-2013	03-01-2013
## 6	6	OFF-EN-10001375	MX-2012-155047	03-01-2013	03-01-2013
## 7	7	OFF-EN-10001375	MX-2013-134096	03-01-2013	04-01-2013
## 8	8	OFF-AR-10003914	MX-2014-135706	03-01-2013	04-01-2013
## 9	9	OFF-FA-10000038	MX-2014-135706	03-01-2013	04-01-2013
## 10	10	OFF-EN-10000761	US-2013-126655	03-01-2013	04-01-2013
## 11	11	FUR-FU-10003066	US-2013-126655	03-01-2013	04-01-2013
## 12	12	OFF-EN-10000075	US-2013-126655	03-01-2013	04-01-2013
## 13	13	OFF-EN-10002226	US-2013-126655	03-01-2013	03-01-2013
## 14	14	FUR-CH-10002132	MX-2013-167759	03-01-2013	03-01-2013
## 15	15	OFF-EN-10001375	MX-2013-134096	03-01-2013	04-01-2013
## 16	16	TEC-MA-10004956	MX-2013-134096	03-01-2013	04-01-2013
## 17	17	OFF-SU-10003474	MX-2013-134096	03-01-2013	04-01-2013
## 18	18	TEC-AC-10001830	MX-2013-134096	03-01-2013	04-01-2013
## 19	19	OFF-BI-10002075	MX-2013-134096	03-01-2013	04-01-2013
## 20	20	OFF-FA-10002526	MX-2013-156335	03-01-2013	04-01-2013

## 21	21	OFF-EN-10001375	MX-2013-134096	04-01-2013	05-01-2013
## 22	22	TEC-MA-10004956	MX-2013-134096	04-01-2013	05-01-2013
## 23	23	OFF-SU-10003474	MX-2013-134096	04-01-2013	05-01-2013
## 24	24	TEC-AC-10001830	MX-2013-134096	04-01-2013	05-01-2013
## 25	25	OFF-BI-10002075	MX-2013-134096	04-01-2013	05-01-2013
## 26	26	OFF-EN-10001375	MX-2013-134096	04-01-2013	05-01-2013
## 27	27	TEC-MA-10004956	MX-2013-134096	04-01-2013	05-01-2013
## 28	28	OFF-SU-10003474	MX-2013-134096	04-01-2013	05-01-2013
## 29	29	TEC-AC-10001830	MX-2013-134096	04-01-2013	05-01-2013
## 30	30	OFF-BI-10002075	MX-2013-134096	04-01-2013	05-01-2013
## 31	31	OFF-EN-10000761	US-2013-126655	04-01-2013	05-01-2013
## 32	32	FUR-FU-10003066	US-2013-126655	04-01-2013	05-01-2013
## 33	33	OFF-EN-10000075	US-2013-126655	04-01-2013	05-01-2013
## 34	34	OFF-EN-10002226	US-2013-126655	04-01-2013	04-01-2013
## 35	35	FUR-CH-10002132	MX-2013-167759	04-01-2013	04-01-2013
## 36	36	OFF-EN-10001375	MX-2013-134096	04-01-2013	05-01-2013
## 37	37	TEC-MA-10004956	MX-2013-134096	04-01-2013	05-01-2013
## 38	38	OFF-SU-10003474	MX-2013-134096	04-01-2013	05-01-2013
## 39	39	TEC-AC-10001830	MX-2013-134096	04-01-2013	05-01-2013
## 40	40	OFF-BI-10002075	MX-2013-134096	04-01-2013	05-01-2013
## 41	41	OFF-FA-10002526	MX-2013-156335	04-01-2013	05-01-2013
## 42	42	OFF-EN-10001375	MX-2013-134096	04-01-2013	05-01-2013
## 43	43	TEC-MA-10004956	MX-2013-134096	04-01-2013	05-01-2013
## 44	44	OFF-SU-10003474	MX-2013-134096	05-01-2013	06-01-2013
## 45	45	TEC-AC-10001830	MX-2013-134096	05-01-2013	06-01-2013
## 46	46	OFF-BI-10002075	MX-2013-134096	05-01-2013	06-01-2013
## 47	47	OFF-EN-10001375	MX-2013-134096	05-01-2013	06-01-2013
## 48	48	TEC-MA-10004956	MX-2013-134096	05-01-2013	06-01-2013
## 49	49	OFF-SU-10003474	MX-2013-134096	05-01-2013	06-01-2013
## 50	50	OFF-LA-10002782	MX-2014-143658	03-01-2013	03-01-2013
## 51	1	OFF-LA-10002782	MX-2014-143658	01-01-2013	02-01-2013
## 52	2	FUR-FU-10004015	MX-2012-155047	01-01-2013	02-01-2013
## 53	3	FUR-BO-10002352	MX-2012-155047	01-01-2013	02-01-2013
## 54	4	OFF-BI-10004428	MX-2012-155047	01-01-2013	02-01-2013
## 55	5	OFF-AR-10004594	MX-2012-155047	01-01-2013	02-01-2013
## 56	6	OFF-EN-10001375	MX-2012-155047	01-01-2013	02-01-2013
## 57	7	OFF-EN-10001375	MX-2013-134096	01-01-2013	02-01-2013
## 58	8	TEC-MA-10004956	MX-2013-134096	01-01-2013	02-01-2013
## 59	9	OFF-SU-10003474	MX-2013-134096	01-01-2013	02-01-2013
## 60	10	TEC-AC-10001830	MX-2013-134096	01-01-2013	02-01-2013
## 61	11	OFF-BI-10002075	MX-2013-134096	01-01-2013	02-01-2013
## 62	12	OFF-FA-10002526	MX-2013-156335	01-01-2013	02-01-2013
## 63	13	FUR-CH-10002846	MX-2013-156335	01-01-2013	02-01-2013
## 64	14	OFF-EN-10004100	MX-2014-121923	02-01-2013	04-01-2013
## 65	15	OFF-AR-10003914	MX-2014-135706	02-01-2013	03-01-2013
## 66	16	OFF-FA-10000038	MX-2014-135706	02-01-2013	03-01-2013
## 67	17	OFF-EN-10000761	US-2013-126655	02-01-2013	03-01-2013
## 68	18	FUR-FU-10003066	US-2013-126655	02-01-2013	03-01-2013
## 69	19	OFF-EN-10000075	US-2013-126655	02-01-2013	03-01-2013
## 70	20	OFF-EN-10002226	US-2013-126655	02-01-2013	03-01-2013
## 71	21	FUR-CH-10002132	MX-2013-167759	02-01-2013	04-01-2013
## 72	22	TEC-AC-10002749	MX-2013-163139	02-01-2013	02-01-2013
## 73	23	OFF-SU-10000066	MX-2013-163139	02-01-2013	02-01-2013
## 74	24	OFF-BI-10003934	US-2014-119753	02-01-2013	03-01-2013

## 75	25	OFF-BI-10003932	US-2012-133970	02-01-2013	03-01-2013
##	Cost.Price	Quantity	Sales.Price	Shipping.Index	Shipping.Type
## 1	341.520	2	683.040	10	STANDARD
## 2	252.160	8	2017.280	2	PRIORITY
## 3	193.280	2	386.560	3	PRIORITY
## 4	35.440	4	141.760	4	PRIORITY
## 5	71.600	2	143.200	5	PRIORITY
## 6	56.120	2	112.240	6	PRIORITY
## 7	56.120	2	112.240	7	STANDARD
## 8	132.640	4	530.560	15	STANDARD
## 9	12.940	1	12.940	16	STANDARD
## 10	18.840	2	37.280	17	STANDARD
## 11	308.280	7	2157.560	18	STANDARD
## 12	40.176	2	79.952	19	STANDARD
## 13	8.784	3	25.952	20	PRIORITY
## 14	273.472	4	1093.688	21	PRIORITY
## 15	56.120	2	112.240	7	STANDARD
## 16	344.640	3	1033.920	8	STANDARD
## 17	97.360	4	389.440	9	STANDARD
## 18	341.520	2	683.040	10	STANDARD
## 19	12.060	3	36.180	11	STANDARD
## 20	20.760	3	62.280	12	STANDARD
## 21	56.120	2	112.240	7	STANDARD
## 22	344.640	3	1033.920	8	STANDARD
## 23	97.360	4	389.440	9	STANDARD
## 24	341.520	2	683.040	10	STANDARD
## 25	12.060	3	36.180	11	STANDARD
## 26	56.120	2	112.240	7	STANDARD
## 27	344.640	3	1033.920	8	STANDARD
## 28	97.360	4	389.440	9	STANDARD
## 29	341.520	2	683.040	10	STANDARD
## 30	12.060	3	36.180	11	STANDARD
## 31	18.840	2	37.280	17	STANDARD
## 32	308.280	7	2157.560	18	STANDARD
## 33	40.176	2	79.952	19	STANDARD
## 34	8.784	3	25.952	20	PRIORITY
## 35	273.472	4	1093.688	21	PRIORITY
## 36	56.120	2	112.240	7	STANDARD
## 37	344.640	3	1033.920	8	STANDARD
## 38	97.360	4	389.440	9	STANDARD
## 39	341.520	2	683.040	10	STANDARD
## 40	12.060	3	36.180	11	STANDARD
## 41	20.760	3	62.280	12	STANDARD
## 42	56.120	2	112.240	7	STANDARD
## 43	344.640	3	1033.920	8	STANDARD
## 44	97.360	4	389.440	9	STANDARD
## 45	341.520	2	683.040	10	STANDARD
## 46	12.060	3	36.180	11	STANDARD
## 47	56.120	2	112.240	7	STANDARD
## 48	344.640	3	1033.920	8	STANDARD
## 49	97.360	4	389.440	9	STANDARD
## 50	13.080	3	39.240	1	PRIORITY
## 51	13.080	3	39.240	1	PRIORITY
## 52	252.160	8	2017.280	2	PRIORITY

## 53	193.280	2	386.560	3	PRIORITY
## 54	35.440	4	141.760	4	PRIORITY
## 55	71.600	2	143.200	5	PRIORITY
## 56	56.120	2	112.240	6	PRIORITY
## 57	56.120	2	112.240	7	STANDARD
## 58	344.640	3	1033.920	8	STANDARD
## 59	97.360	4	389.440	9	STANDARD
## 60	341.520	2	683.040	10	STANDARD
## 61	12.060	3	36.180	11	STANDARD
## 62	20.760	3	62.280	12	STANDARD
## 63	210.640	4	842.560	13	STANDARD
## 64	80.100	3	240.300	14	STANDARD
## 65	132.640	4	530.560	15	STANDARD
## 66	12.940	1	12.940	16	STANDARD
## 67	18.840	2	37.280	17	STANDARD
## 68	308.280	7	2157.560	18	STANDARD
## 69	40.176	2	79.952	19	STANDARD
## 70	8.784	3	25.952	20	PRIORITY
## 71	273.472	4	1093.688	21	PRIORITY
## 72	27.000	1	27.000	22	PRIORITY
## 73	207.000	9	1863.000	23	PRIORITY
## 74	60.660	3	181.580	24	PRIORITY
## 75	181.116	9	1629.644	25	PRIORITY

## Category

## 1	Technology
## 2	Furniture
## 3	Furniture
## 4	Office Supplies
## 5	Office Supplies
## 6	Office Supplies
## 7	Office Supplies
## 8	Office Supplies
## 9	Office Supplies
## 10	Office Supplies
## 11	Furniture
## 12	Office Supplies
## 13	Office Supplies
## 14	Furniture
## 15	Office Supplies
## 16	Technology
## 17	Office Supplies
## 18	Technology
## 19	Office Supplies
## 20	Office Supplies
## 21	Office Supplies
## 22	Technology
## 23	Office Supplies
## 24	Technology
## 25	Office Supplies
## 26	Office Supplies
## 27	Technology
## 28	Office Supplies
## 29	Technology
## 30	Office Supplies

```
## 31 Office Supplies
## 32      Furniture
## 33 Office Supplies
## 34 Office Supplies
## 35      Furniture
## 36 Office Supplies
## 37      Technology
## 38 Office Supplies
## 39      Technology
## 40 Office Supplies
## 41 Office Supplies
## 42 Office Supplies
## 43      Technology
## 44 Office Supplies
## 45      Technology
## 46 Office Supplies
## 47 Office Supplies
## 48      Technology
## 49 Office Supplies
## 50 Office Supplies
## 51 Office Supplies
## 52      Furniture
## 53      Furniture
## 54 Office Supplies
## 55 Office Supplies
## 56 Office Supplies
## 57 Office Supplies
## 58      Technology
## 59 Office Supplies
## 60      Technology
## 61 Office Supplies
## 62 Office Supplies
## 63      Furniture
## 64 Office Supplies
## 65 Office Supplies
## 66 Office Supplies
## 67 Office Supplies
## 68      Furniture
## 69 Office Supplies
## 70 Office Supplies
## 71      Furniture
## 72      Technology
## 73 Office Supplies
## 74 Office Supplies
## 75 Office Supplies
```

## describeBy() with Grouping variables

*# Code Section -19*

```
library("psych", lib.loc=~ /R/x86_64-linux-gnu-library/3.3")
library(psych)
```



```
##describeBy() # Seek HELP for the function - Uncomment this line.
```

```
describeBy(df_3_C,df_3_C$Date.of.Invoice)
```

```
##
## Descriptive statistics by group
## group: 01-01-2013
##      vars  n   mean    sd median trimmed   mad   min    max   range  skew
## 1      1 26   7.00   3.82   7.00    7.00   4.45  1.00   13.00   12.00  0.00
## 2      2 26  12.85   7.49  14.00   12.91  10.38  1.00   24.00   23.00 -0.06
## 3      3 26   2.23   1.84   2.00    1.82   1.48  1.00    8.00    7.00  2.27
## 4      4 26   1.00   0.00   1.00    1.00   0.00  1.00    1.00    0.00  NaN
## 5      5 26   1.00   0.00   1.00    1.00   0.00  1.00    1.00    0.00  NaN
## 6      6 26 131.14 120.02  71.60  122.55  86.76 12.06  344.64  332.58  0.66
## 7      7 26   3.23   1.61   3.00    2.91   1.48  2.00    8.00    6.00  1.86
## 8      8 26 461.53 559.95 143.20  358.77 158.67 36.18 2017.28 1981.10  1.60
## 9      9 26   7.00   3.82   7.00    7.00   4.45  1.00   13.00   12.00  0.00
## 10     10 26   1.54   0.51   2.00    1.55   0.00  1.00    2.00    1.00 -0.15
## 11     11 26   1.92   0.63   2.00    1.91   0.00  1.00    3.00    2.00  0.04
## 12     12 26  19.50  13.31  19.50   19.50  18.53  1.00   38.00   37.00  0.00
## 13     13 26  10.00   5.11  10.50   10.05   5.93  1.00   18.00   17.00 -0.05
## 14     14 26   3.65   2.50   2.00    3.59   1.48  1.00    7.00    6.00  0.41
## 15     15 26   1.58   0.58   2.00    1.55   0.74  1.00    3.00    2.00  0.31
## 16     16 26   2.27   0.87   2.00    2.27   1.48  1.00    4.00    3.00 -0.17
## 17     17 26 135.66 129.31  63.86  128.20  76.15  8.78  344.64  335.86  0.61
## 18     18 26   3.15   1.76   2.50    2.91   0.74  1.00    8.00    7.00  1.43
## 19     19 26 524.05 673.79 142.48  421.43 182.41 12.94 2157.56 2144.62  1.41
## 20     20 26  11.77   6.06  10.00   11.82   8.15  2.00   21.00   19.00  0.08
## 21     21 26   1.69   0.47   2.00    1.73   0.00  1.00    2.00    1.00 -0.79
## 22     22 26   1.96   0.60   2.00    1.95   0.00  1.00    3.00    2.00  0.01
##      kurtosis    se
## 1      -1.35    0.75
## 2      -1.45    1.47
## 3       4.52    0.36
## 4       NaN     0.00
## 5       NaN     0.00
## 6      -1.14   23.54
## 7       3.10    0.32
## 8       1.80 109.82
## 9      -1.35    0.75
## 10     -2.05    0.10
## 11     -0.59    0.12
## 12     -1.79    2.61
## 13     -1.12    1.00
## 14     -1.68    0.49
## 15     -0.98    0.11
## 16     -1.18    0.17
## 17     -1.41   25.36
## 18      1.15    0.35
## 19      0.74 132.14
## 20     -1.55    1.19
## 21     -1.43    0.09
## 22     -0.33    0.12
```

```
## -----
## group: 02-01-2013
##      vars  n    mean      sd median trimmed      mad   min      max     range  skew
## 1      1 24   19.50    3.53   19.50   19.50    4.45 14.00    25.00    11.00   0.00
## 2      2 24   12.25    6.24   12.50   12.20    5.93  2.00    23.00    21.00  -0.01
## 3      3 24    7.75    2.51    8.00    7.80    2.97  4.00    11.00     7.00  -0.27
## 4      4 24    2.00    0.00    2.00    2.00    0.00  2.00     2.00     0.00   NaN
## 5      5 24    2.00    0.59    2.00    2.00    0.00  1.00     3.00     2.00   0.00
## 6      6 24  112.58  103.84   70.38  103.39   88.24  8.78   308.28  299.50   0.65
## 7      7 24    4.00    2.77    3.00    3.80    1.48  1.00     9.00     8.00   0.80
## 8      8 24  656.62  790.46  210.94  570.90  283.91 12.94  2157.56 2144.62   0.80
## 9      9 24   19.50    3.53   19.50   19.50    4.45 14.00    25.00    11.00   0.00
## 10     10 24    1.50    0.51    1.50    1.50    0.74  1.00     2.00     1.00   0.00
## 11     11 24    1.92    0.50    2.00    1.90    0.00  1.00     3.00     2.00  -0.17
## 12     12 24   32.00   13.25   32.00   32.00   18.53 14.00    50.00    36.00   0.00
## 13     13 24   13.38    4.59   15.50   13.80    3.71  2.00    18.00    16.00  -0.82
## 14     14 24    2.33    0.92    2.00    2.10    0.00  2.00     6.00     4.00   2.91
## 15     15 24    1.92    0.78    2.00    1.90    1.48  1.00     3.00     2.00   0.13
## 16     16 24    2.83    0.92    3.00    2.90    1.48  1.00     4.00     3.00  -0.34
## 17     17 24  155.62  145.56   97.36  151.07  126.47 12.06   344.64  332.58   0.41
## 18     18 24    2.88    0.74    3.00    2.85    1.48  2.00     4.00     2.00   0.18
## 19     19 24  428.20  396.14  389.44  403.84  460.17 36.18  1093.69 1057.51   0.49
## 20     20 24    9.42    3.37    9.00    9.25    2.22  1.00    21.00    20.00   1.02
## 21     21 24    1.92    0.28    2.00    2.00    0.00  1.00     2.00     1.00  -2.83
## 22     22 24    2.29    0.55    2.00    2.30    0.00  1.00     3.00     2.00   0.08
##      kurtosis      se
## 1      -1.36    0.72
## 2      -1.08    1.27
## 3      -1.57    0.51
## 4         NaN    0.00
## 5      -0.24    0.12
## 6      -1.12   21.20
## 7      -0.83    0.56
## 8      -1.09  161.35
## 9      -1.36    0.72
## 10     -2.08    0.10
## 11      0.61    0.10
## 12     -1.84    2.70
## 13     -0.53    0.94
## 14      8.15    0.19
## 15     -1.40    0.16
## 16     -0.84    0.19
## 17     -1.77   29.71
## 18     -1.24    0.15
## 19     -1.40   80.86
## 20      4.49    0.69
## 21      6.27    0.06
## 22     -0.77    0.11
```

```
# In this case - Grouping Variable is - Date of Invoice .
# This Grouping variable has two Values here - 01-01-2013 and 02-01-2013

# IMPORTANT NOTE --- The DOLLAR SIGN in df_3_C$Date.of.Invoice , is used
# to access a certain variable within the DATA FRAME.
```

```
# Also note that the variables within the DATA FRAME will not be stored with the Labels
# as - is
```

## Built in DATA Sets

The default R environment - comes bundled with a number of packages and data sets.

A package called DATASETS - contains a number of inbuilt data sets as seen in sections below -

```
# Code Section -20
```

```
library(help = "datasets")
```

```
#
# Seen below are the DataSets available within my installed version of R - yours may slightly differ :-
#
# AirPassengers      Monthly Airline Passenger Numbers 1949-1960
# BJSales            Sales Data with Leading Indicator
# BOD               Biochemical Oxygen Demand
# CO2               Carbon Dioxide Uptake in Grass Plants
# ChickWeight       Weight versus age of chicks on different diets
# DNase             Elisa assay of DNase
# EuStockMarkets    Daily Closing Prices of Major European Stock
#                  Indices, 1991-1998
# Formaldehyde      Determination of Formaldehyde
# HairEyeColor      Hair and Eye Color of Statistics Students
# Harman23.cor       Harman Example 2.3
# Harman74.cor       Harman Example 7.4
# Indometh           Pharmacokinetics of Indomethacin
# InsectSprays       Effectiveness of Insect Sprays
# JohnsonJohnson    Quarterly Earnings per Johnson & Johnson Share
# LakeHuron          Level of Lake Huron 1875-1972
# LifeCycleSavings   Intercountry Life-Cycle Savings Data
# Loblolly           Growth of Loblolly pine trees
# Nile              Flow of the River Nile
# Orange            Growth of Orange Trees
# OrchardSprays      Potency of Orchard Sprays
# PlantGrowth        Results from an Experiment on Plant Growth
# Puromycin          Reaction Velocity of an Enzymatic Reaction
# Theoph            Pharmacokinetics of Theophylline
# Titanic            Survival of passengers on the Titanic
# ToothGrowth        The Effect of Vitamin C on Tooth Growth in
#                  Guinea Pigs
# UCBAAdmissions     Student Admissions at UC Berkeley
# UKDriverDeaths     Road Casualties in Great Britain 1969-84
# UKLungDeaths       Monthly Deaths from Lung Diseases in the UK
# UKGas             UK Quarterly Gas Consumption
# USAccDeaths        Accidental Deaths in the US 1973-1978
# USArrests          Violent Crime Rates by US State
# USJudgeRatings     Lawyers' Ratings of State Judges in the US
#                  Superior Court
```

# USPersonalExpenditure	Personal Expenditure Data
# VADeaths	Death Rates in Virginia (1940)
# WWWusage	Internet Usage per Minute
# WorldPhones	The World's Telephones
# ability.cov	Ability and Intelligence Tests
# airmiles	Passenger Miles on Commercial US Airlines,
#	1937-1960
# airquality	New York Air Quality Measurements
# anscombe	Anscombe's Quartet of 'Identical' Simple Linear
#	Regressions
# attenu	The Joyner-Boore Attenuation Data
# attitude	The Chatterjee-Price Attitude Data
# austres	Quarterly Time Series of the Number of
#	Australian Residents
# beavers	Body Temperature Series of Two Beavers
# cars	Speed and Stopping Distances of Cars
# chickwts	Chicken Weights by Feed Type
# co2	Mauna Loa Atmospheric CO2 Concentration
# crimtab	Student's 3000 Criminals Data
# datasets-package	The R Datasets Package
# discoveries	Yearly Numbers of Important Discoveries
# esoph	Smoking, Alcohol and (O)esophageal Cancer
# euro	Conversion Rates of Euro Currencies
# eurodist	Distances Between European Cities and Between
#	US Cities
# faithful	Old Faithful Geyser Data
# freeny	Freeny's Revenue Data
# infert	Infertility after Spontaneous and Induced
#	Abortion
# iris	Edgar Anderson's Iris Data
# islands	Areas of the World's Major Landmasses
# lh	Luteinizing Hormone in Blood Samples
# longley	Longley's Economic Regression Data
# lynx	Annual Canadian Lynx trappings 1821-1934
# morley	Michelson Speed of Light Data
# mtcars	Motor Trend Car Road Tests
# nhtemp	Average Yearly Temperatures in New Haven
# nottem	Average Monthly Temperatures at Nottingham,
#	1920-1939
# npk	Classical N, P, K Factorial Experiment
# occupationalStatus	Occupational Status of Fathers and their Sons
# precip	Annual Precipitation in US Cities
# presidents	Quarterly Approval Ratings of US Presidents
# pressure	Vapor Pressure of Mercury as a Function of
#	Temperature
# quakes	Locations of Earthquakes off Fiji
# randu	Random Numbers from Congruential Generator
#	RANDU
# rivers	Lengths of Major North American Rivers
# rock	Measurements on Petroleum Rock Samples
# sleep	Student's Sleep Data
# stackloss	Brownlee's Stack Loss Plant Data
# state	US State Facts and Figures

```

# sunspot.month      Monthly Sunspot Data, from 1749 to "Present"
# sunspot.year       Yearly Sunspot Data, 1700-1988
# sunspots           Monthly Sunspot Numbers, 1749-1983
# swiss              Swiss Fertility and Socioeconomic Indicators
#                   (1888) Data
# treering           Yearly Treering Data, -6000-1979
# trees              Girth, Height and Volume for Black Cherry Trees
# uspop              Populations Recorded by the US Census
# volcano            Topographic Information on Auckland's Maunga
#                   Whau Volcano
# warpbreaks         The Number of Breaks in Yarn during Weaving
# women              Average Heights and Weights for American Women
#

```

## ATTACH and DETACH Datasets

To OPERATE upon an inbuilt DATASET we need to LOAD it into R .

In lay-man terms , we may equate this to our earlier - `read.csv()` , but there are subtle differences.

The ATTACH will pull in a Data Set from the DataSet Package into our R Search Path.

*# Code Section -21*

`?attach()`

```

# # Quoting below from inbuilt HELP -
# # The database is attached to the R search path. This means that the database is
# # searched by R when evaluating a variable, so objects in the database can be accessed
# # by simply giving their names.

```

`?detach()`

```

# # Quoting below from inbuilt HELP -
# # Detach a database, i.e., remove it from the search() path of available R objects.
# Usually this is either a data.frame which has been attached or a package which was attached by library()

```

*# Another Function which will help automate is - zap()*

```

# library(epicalc)
# ?zap()
# https://artax.karlin.mff.cuni.cz/r-help/library/epicalc/html/zap.html

```

*# Code Section -22*

`search()`

```

## [1] ".GlobalEnv"      "package:psych"    "package:stats"
## [4] "package:graphics" "package:grDevices" "package:utils"
## [7] "package:datasets" "package:methods"  "Autoloads"
## [10] "package:base"

```

*# Code Section -23*

```

# Code Section -24
# Code Section -25
# Code Section -26
# Code Section -27
# Code Section -28
# Code Section -29
# Code Section -30
# Code Section -32
# Code Section -33
# Code Section -34
# Code Section -35
# Code Section -36

sessionInfo()

## R version 3.3.2 (2016-10-31)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Ubuntu 16.04.1 LTS
##
## locale:
##  [1] LC_CTYPE=en_IN.UTF-8      LC_NUMERIC=C
##  [3] LC_TIME=en_IN.UTF-8      LC_COLLATE=en_IN.UTF-8
##  [5] LC_MONETARY=en_IN.UTF-8  LC_MESSAGES=en_IN.UTF-8
##  [7] LC_PAPER=en_IN.UTF-8     LC_NAME=C
##  [9] LC_ADDRESS=C             LC_TELEPHONE=C
## [11] LC_MEASUREMENT=en_IN.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods    base
##
## other attached packages:
## [1] psych_1.7.5
##
## loaded via a namespace (and not attached):
##  [1] Rcpp_0.12.8      lattice_0.20-33 digest_0.6.10   rprojroot_1.1
##  [5] grid_3.3.2      nlme_3.1-124    backports_1.0.4 magrittr_1.5
##  [9] evaluate_0.10   stringi_1.1.2   rmarkdown_1.3   tools_3.3.2
## [13] foreign_0.8-66  stringr_1.1.0   yaml_2.1.14     parallel_3.3.2
## [17] mnormt_1.5-5    htmltools_0.3.5 knitr_1.15.1

```