



Programming with R, Week 5

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Week 5

- Bar plots
- Histograms
- Pie Charts
- Blocks
- String Charts
- Plot()



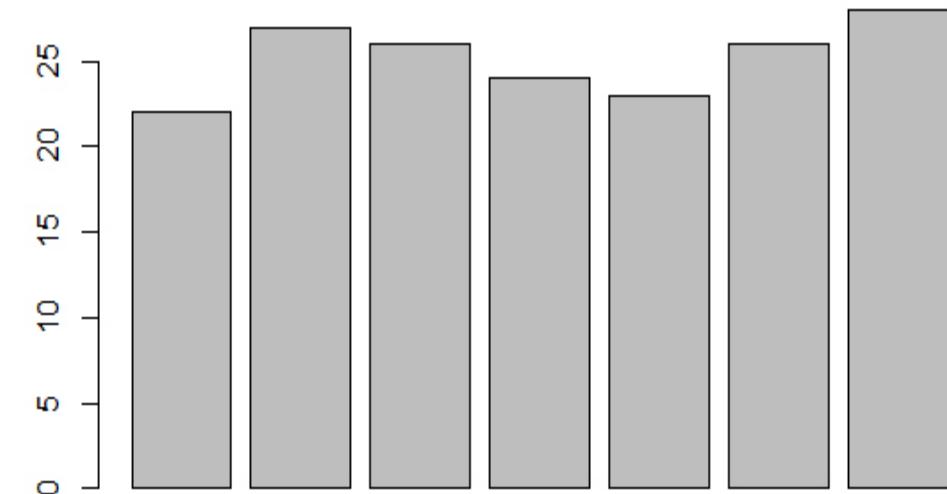
Bar Plots



Bar Plots

barplot() function, supply a vector or matrix

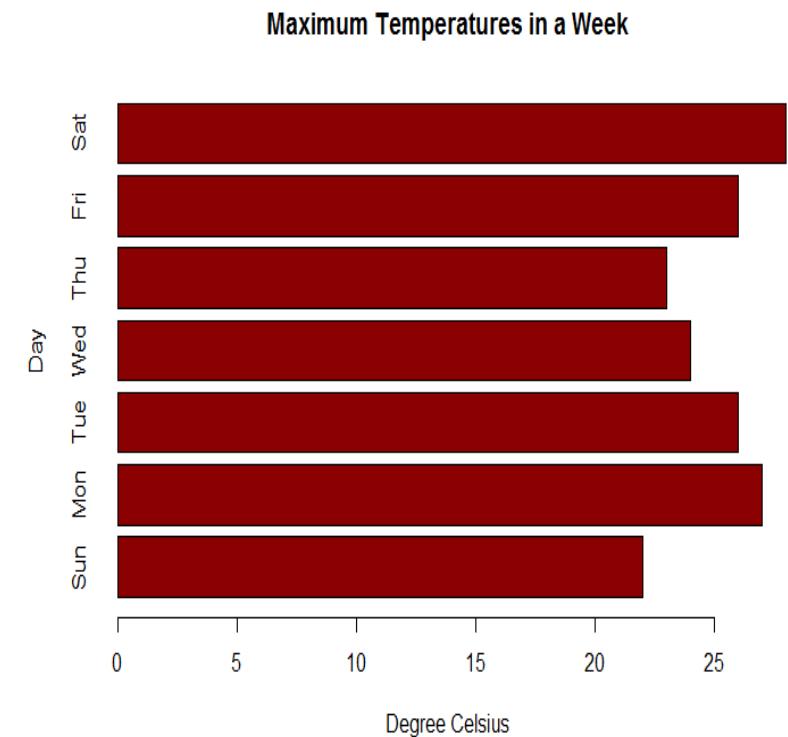
```
> max.temp <- c(22, 27, 26, 24, 23, 26, 28)  
> barplot(max.temp)
```





Bar Plot with Additional Arguments

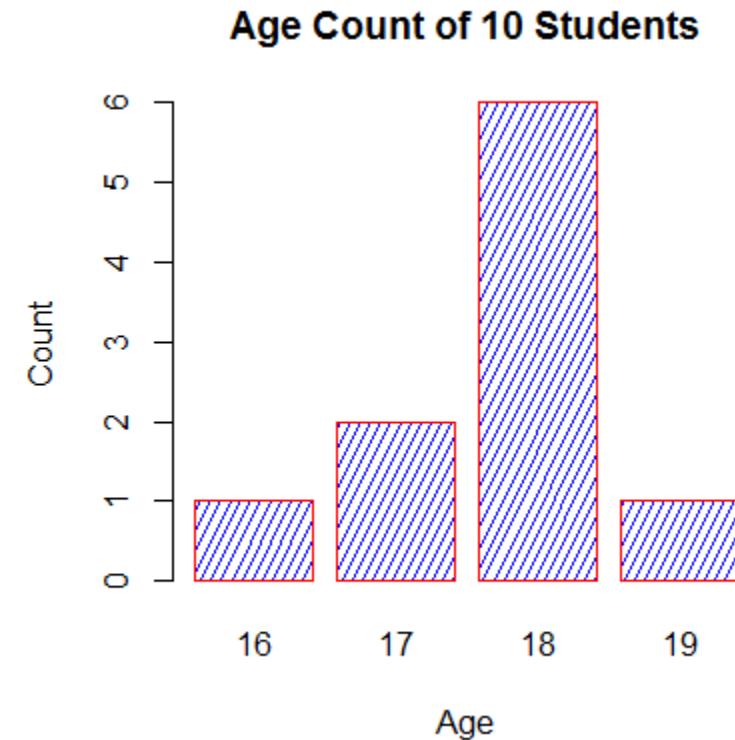
```
> barplot(max.temp,  
         main = "Maximum Temperatures in a Week",  
         xlab = "Degree Celsius",  
         ylab = "Day",  
         names.arg = c("Sun", "Mon", "Tue", "Wed", "Thu", "Fri", "Sat"),  
         col = "darkred",  
         horiz = TRUE)
```





Plot Using a table()

```
> barplot(table(age),  
         main="Age Count of 10 Students",  
         xlab="Age",  
         ylab="Count",  
         border="red",  
         col="blue",  
         density=10  
)
```



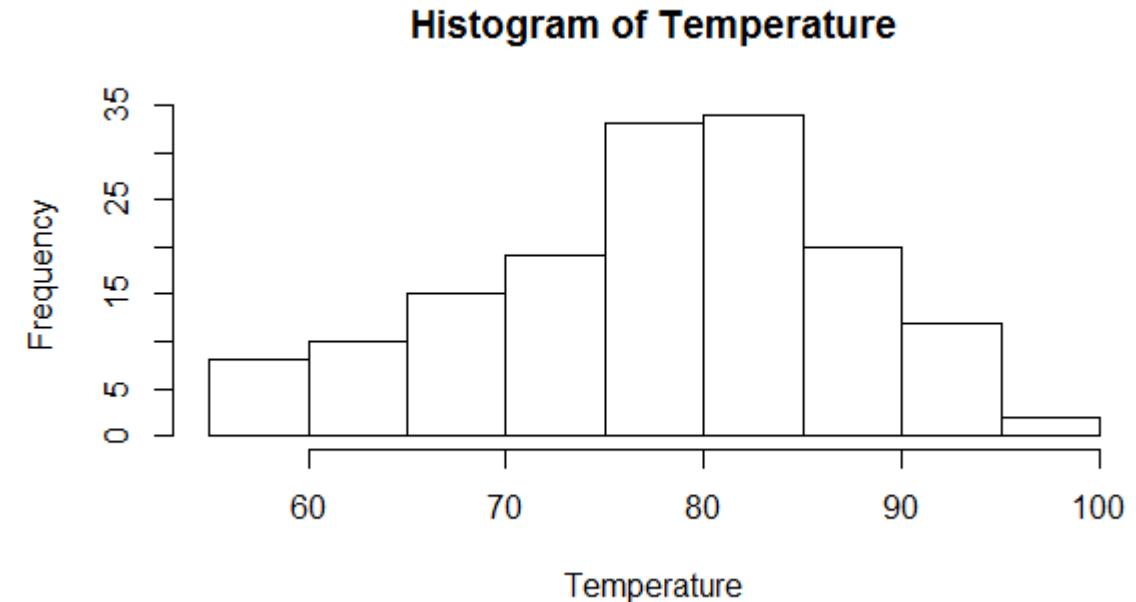


Histogram

Simple Histogram

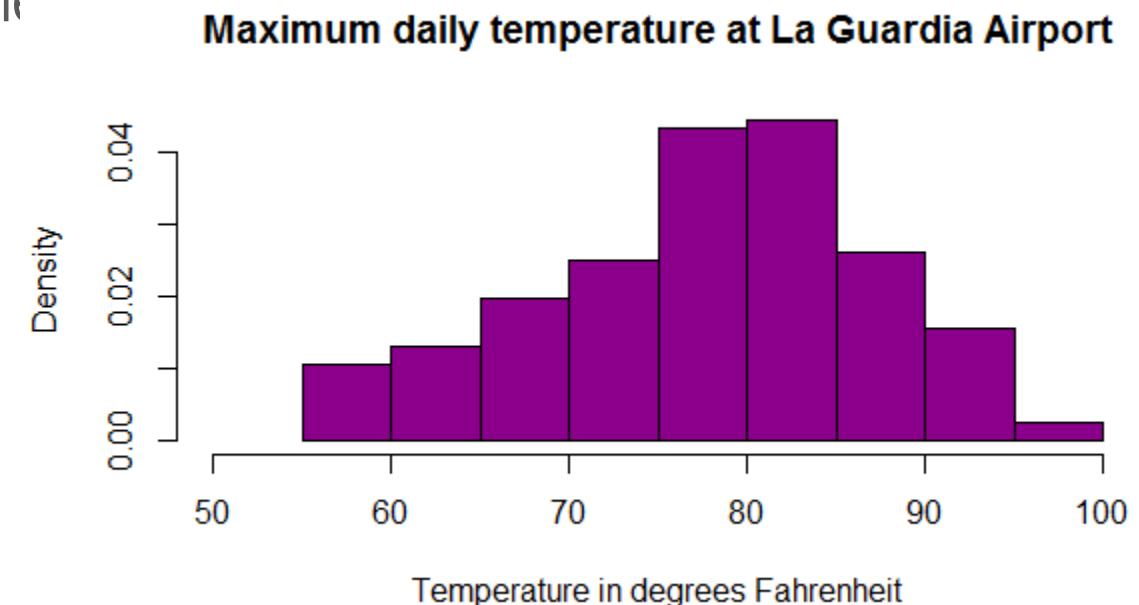
hist() function takes in a vector of values for which the histogram is plotted

```
> str(airquality)  
> Temperature <- airquality$Temp  
> hist(Temperature)
```



Histogram With Added Parameters

```
> hist(Temperature,  
       main="Maximum daily temperature at La Guardia Airport",  
       xlab="Temperature in degrees Fahrenheit",  
       xlim=c(50,100),  
       col="darkmagenta",  
       freq=FALSE)
```

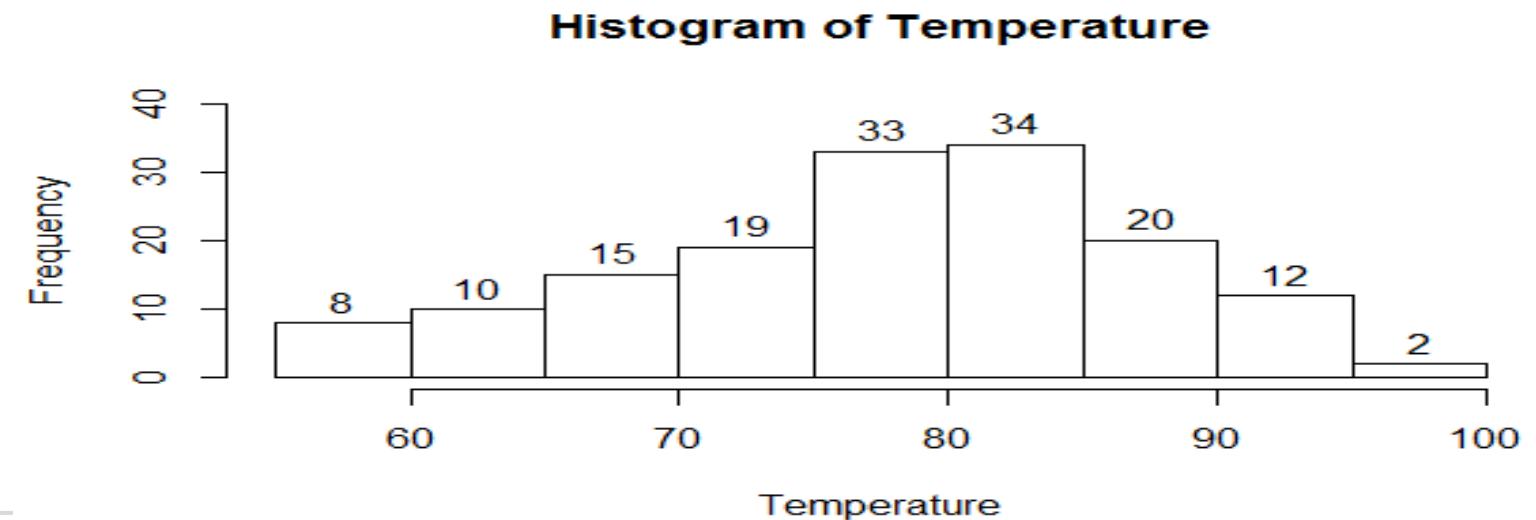


Histogram Return Values

```
# Use Histogram return values for labels using text()
```

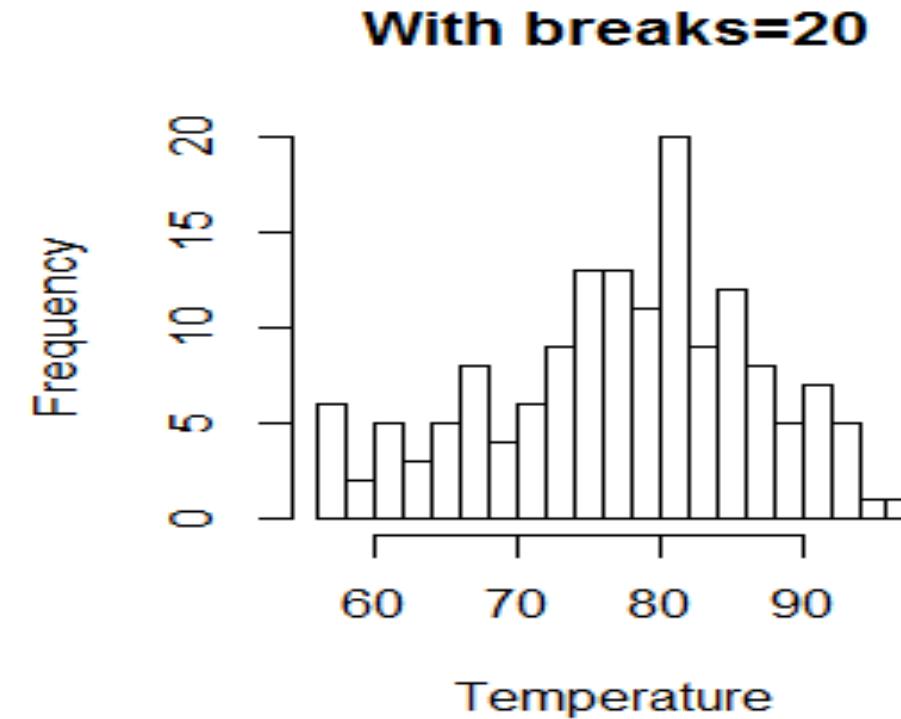
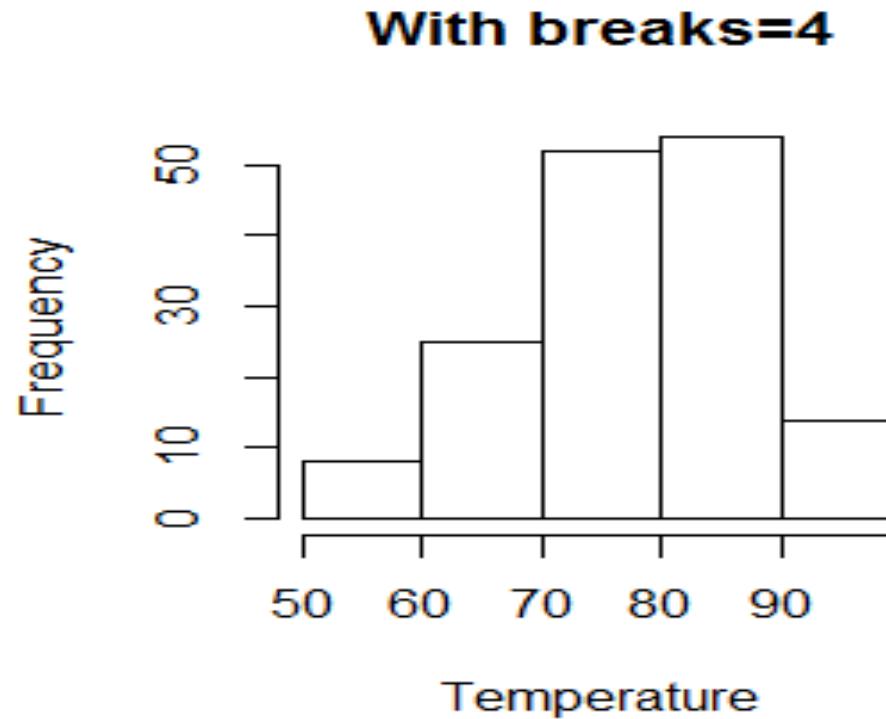
```
h <- hist(Temperature,ylim=c(0,40))
```

```
text(h$mid,h$count,labels=h$count, adj=c(0.5, -0.5))
```



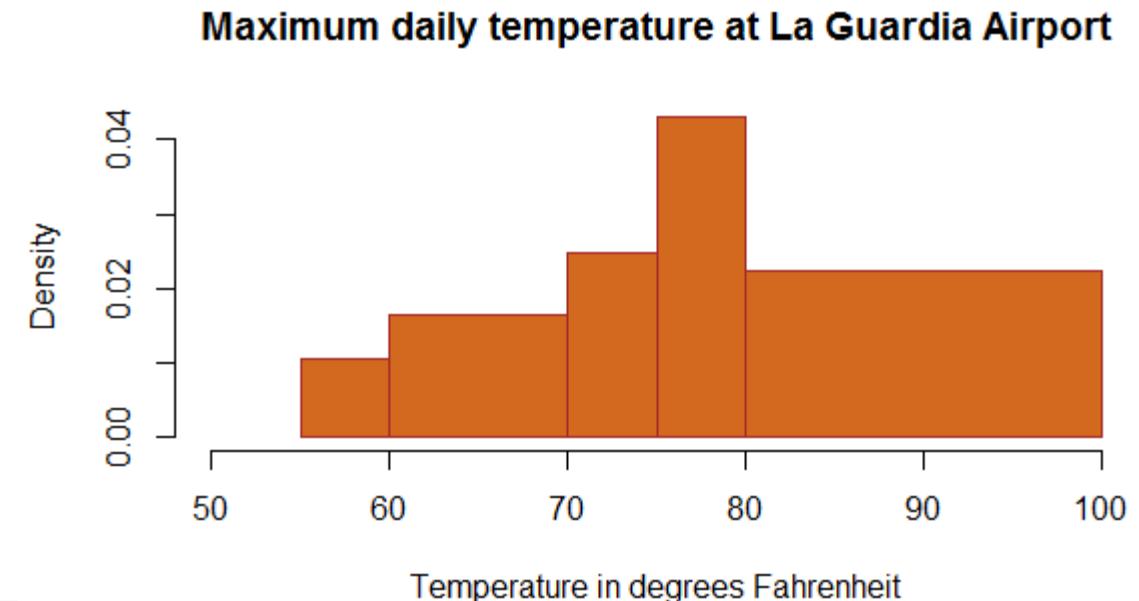
Number of Breaks

- `hist(Temperature, breaks=4, main="With breaks=4")`
- `hist(Temperature, breaks=20, main="With breaks=20")`



Color and Non-uniform Width

- `hist(Temperature,`
- `main="Maximum daily temperature at La Guardia Airport",`
- `xlab="Temperature in degrees Fahrenheit",`
- `xlim=c(50,100), col="chocolate",`
- `border="brown",`
- `breaks=c(55,60,70,75,80,100))`





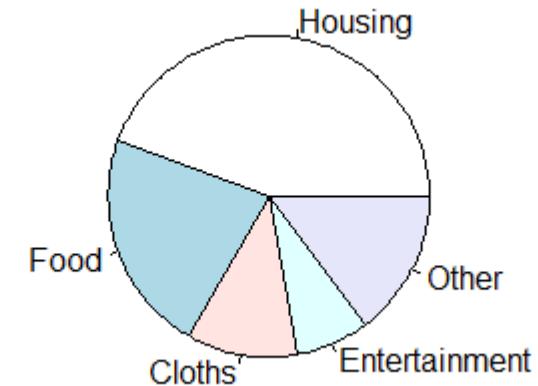
Pie Charts

Simple Pie Chart

> expenditure

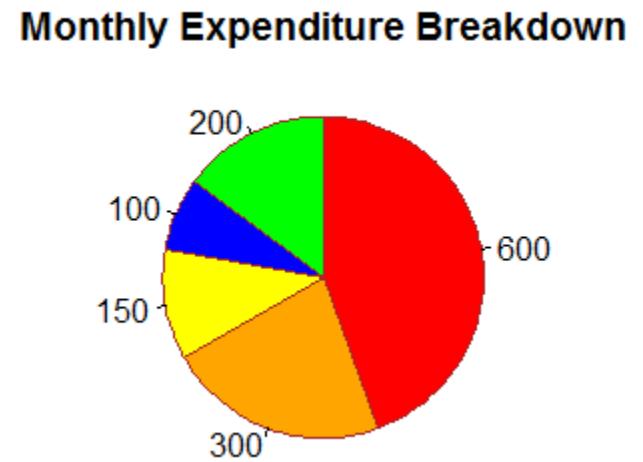
Housing	Food	Cloths	Entertainment	Other
600	300	150	100	200

> pie(expenditure)



Additional Parameters

```
> pie(expenditure,  
      labels=as.character(expenditure),  
      main="Monthly Expenditure Breakdown",  
      col=c("red","orange","yellow","blue","green  
      border="brown",  
      clockwise=TRUE  
)
```





Box Plot

Box Plot

```
> str(airquality)
```

```
'data.frame': 153 obs. of 6 variables:
```

```
 $ Ozone : int 41 36 12 18 NA 28 23 19 8 NA ...
```

```
 $ Solar.R: int 190 118 149 313 NA NA 299 99 19 194 ...
```

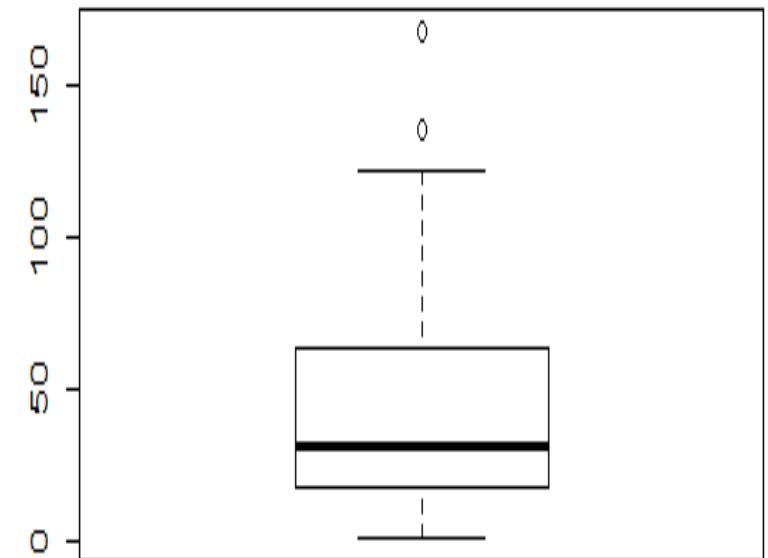
```
 $ Wind : num 7.4 8 12.6 11.5 14.3 14.9 8.6 13.8 20.1 8.6 ...
```

```
 $ Temp : int 67 72 74 62 56 66 65 59 61 69 ...
```

```
 $ Month : int 5 5 5 5 5 5 5 5 5 ...
```

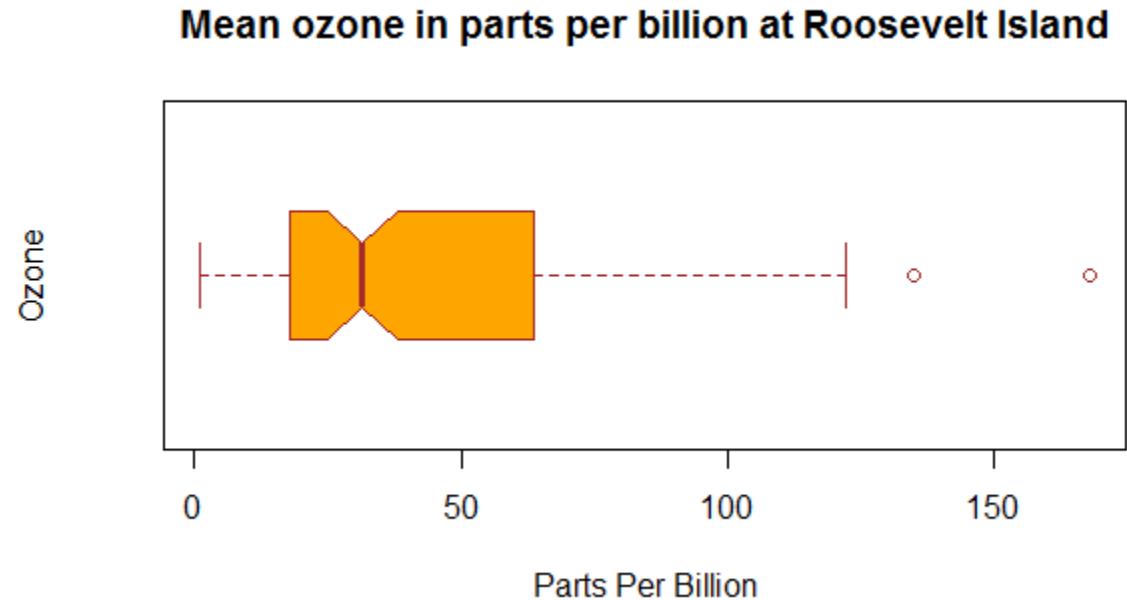
```
 $ Day : int 1 2 3 4 5 6 7 8 9 10 ...
```

```
> boxplot(airquality$Ozone)
```



Box Plot

```
> boxplot(airquality$Ozone,  
  main = "Mean ozone in parts per billion at Roosevelt Island",  
  xlab = "Parts Per Billion",  
  ylab = "Ozone",  
  col = "orange",  
  border = "brown",  
  horizontal = TRUE,  
  notch = TRUE  
)
```



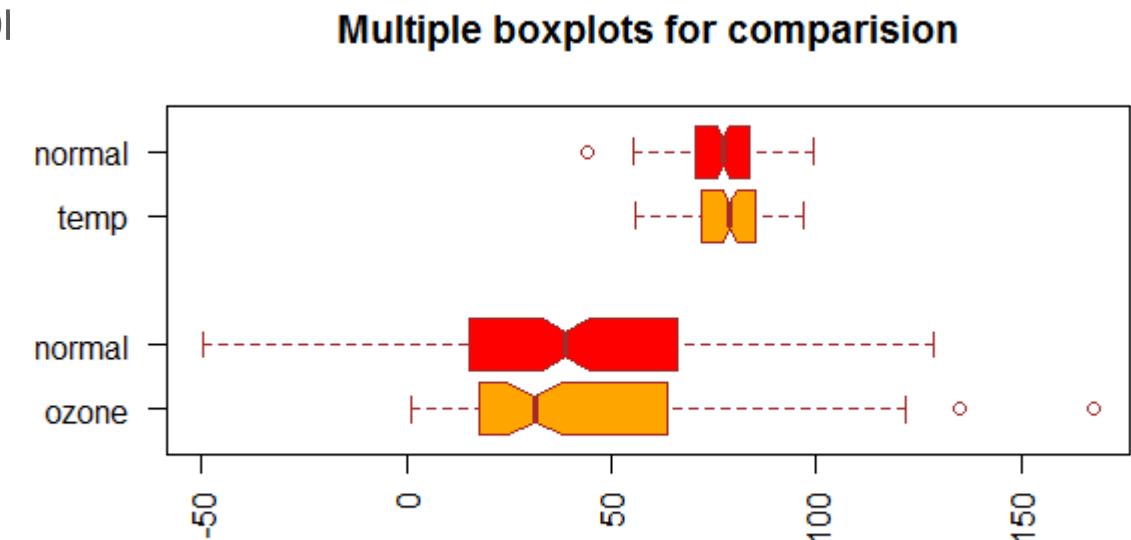


Multiple Boxplots - prep the data

```
# prepare the data
ozone <- airquality$Ozone
temp <- airquality$Temp
# generate normal distribution with same mean and sd
ozone_norm <- rnorm(200,mean=mean(ozone, na.rm=TRUE), sd=sd(ozone, na.rm=TRUE))
temp_norm <- rnorm(200,mean=mean(temp, na.rm=TRUE), sd=sd(temp, na.rm=TRUE))
```

Multiple Boxplots - run

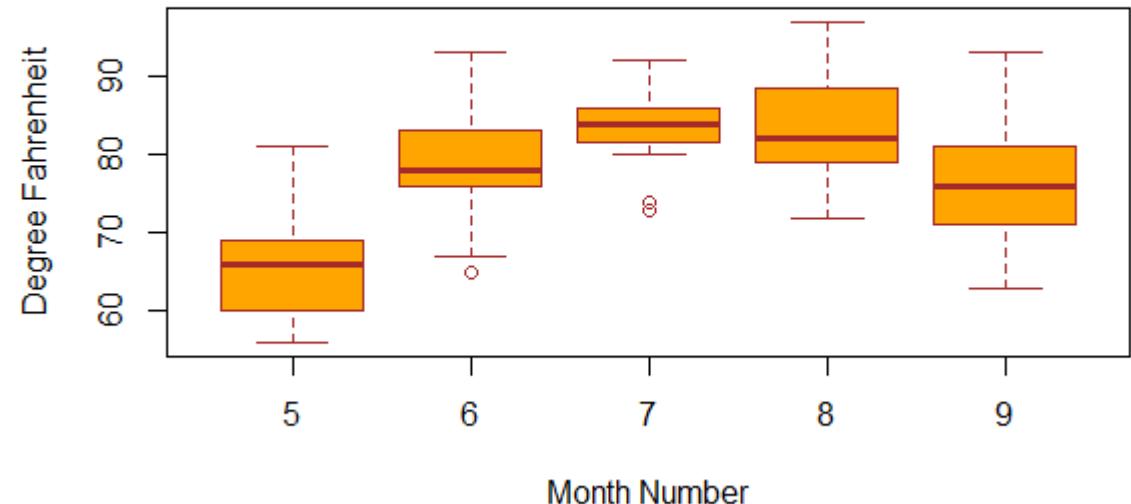
```
boxplot(ozone, ozone_norm, temp, temp_norm,  
        main = "Multiple boxplots for comparision",  
        at = c(1,2,4,5),  
        names = c("ozone", "normal", "temp", "noi  
        las = 2,  
        col = c("orange","red"),  
        border = "brown",  
        horizontal = TRUE,  
        notch = TRUE  
)
```



Boxplot From Formula

```
boxplot(Temp~Month,  
       data=airquality,  
       main="Different boxplots for each month",  
       xlab="Month Number",  
       ylab="Degree Fahrenheit",  
       col="orange",  
       border="brown"  
)
```

Different boxplots for each month



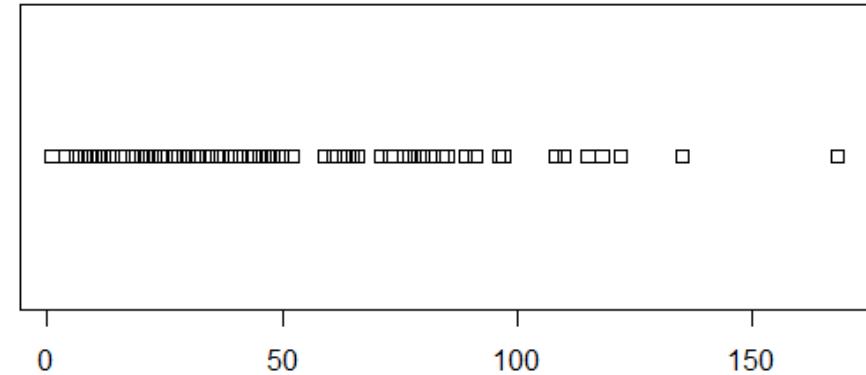


Strip Chart



Simple Strip Chart

```
> str(airquality)
'data.frame':   153 obs. of  6 variables:
 $ Ozone : int  41 36 12 18 NA 28 23 19 8 NA ...
 $ Solar.R: int  190 118 149 313 NA NA 299 99 19 194 .
 $ Wind  : num  7.4 8 12.6 11.5 14.3 14.9 8.6 13.8 20.1
 $ Temp  : int  67 72 74 62 56 66 65 59 61 69 ...
 $ Month : int  5 5 5 5 5 5 5 5 5 ...
 $ Day   : int  1 2 3 4 5 6 7 8 9 10 ...
> stripchart(airquality$Ozone)
```



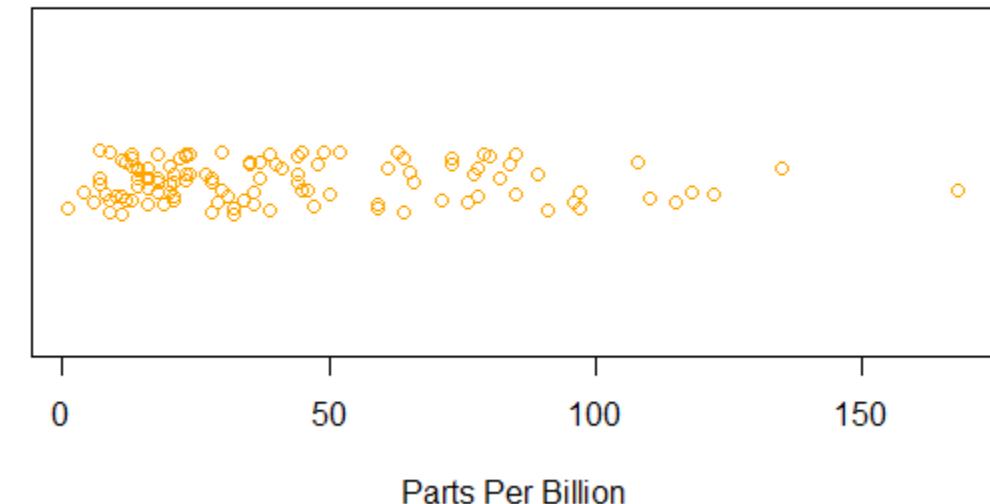
Additional Parameters

```
# main - the title, xlab and ylab- labels for the axes, col-to define color , method
```

```
> stripchart(airquality$Ozone,  
  main="Mean ozone in parts per billion at Roosevelt Island",  
  xlab="Parts Per Billion",  
  ylab="Ozone",  
  method="jitter",  
  col="orange",  
  pch=1  
)
```

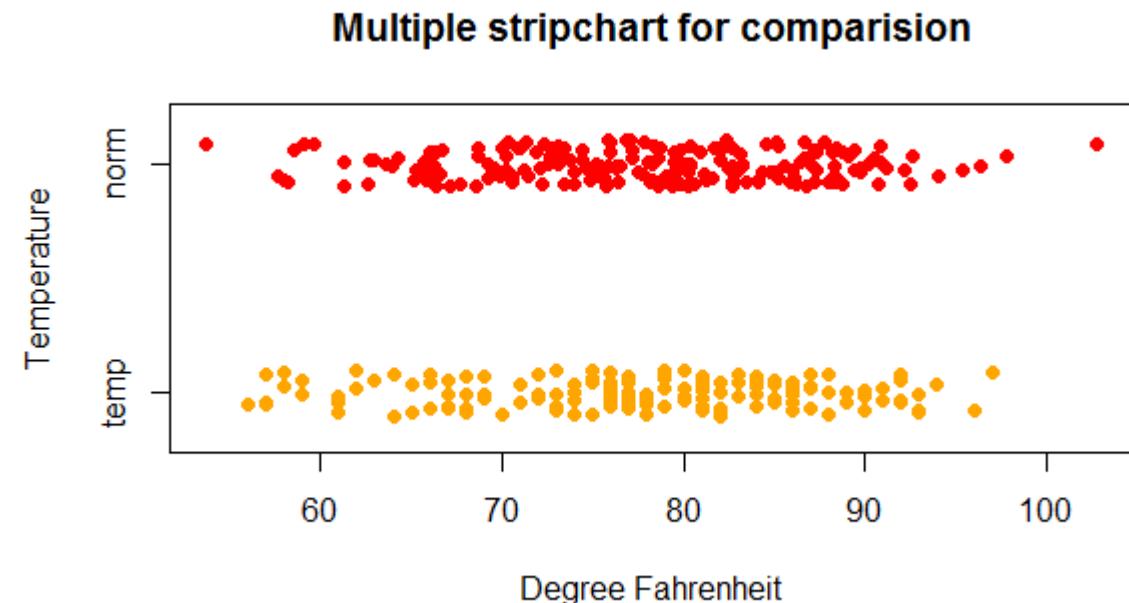
Mean ozone in parts per billion at Roosevelt Island

Ozone



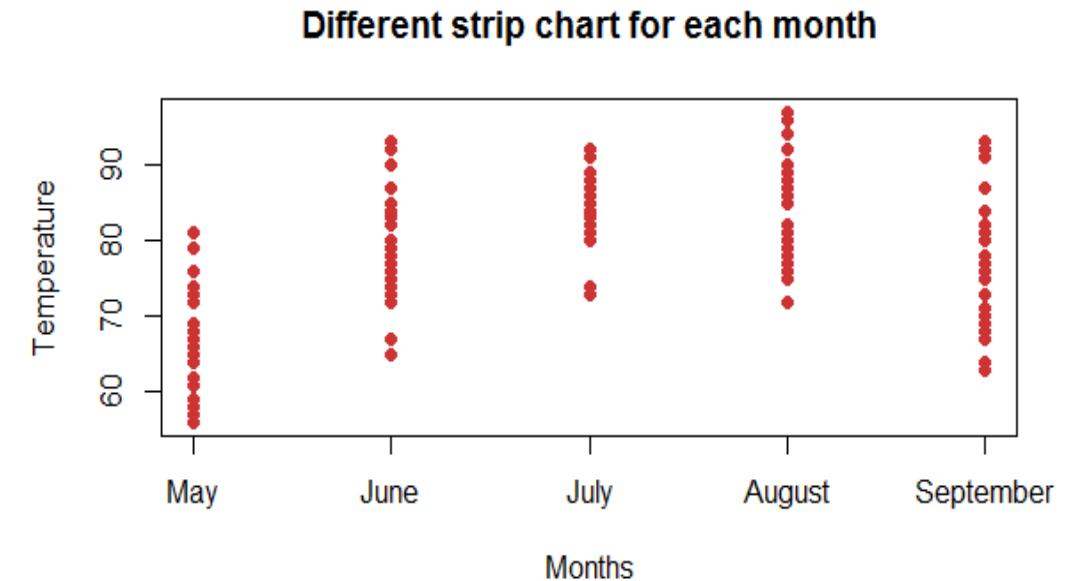
Multiple Strip Charts

```
# prepare the data  
> temp <- airquality$Temp  
# gererate normal distribution with same mean and sd  
> tempNorm <- rnorm(200,mean=mean(temp, na.rm=TRUE), sd = sd(temp, na.rm=TRUE))  
# make a list  
> x <- list("temp"=temp, "norm"=tempNorm)  
> stripchart(x,  
             main="Multiple stripchart for comparision",  
             xlab="Degree Fahrenheit",  
             ylab="Temperature",  
             method="jitter",  
             col=c("orange","red"),  
             pch=16  
)
```



Strip Chart from Formula

```
> stripchart(Temp~Month,  
           data=airquality,  
           main="Different strip chart for each month",  
           xlab="Months",  
           ylab="Temperature",  
           col="brown3",  
           group.names=c("May","June","July","August","September"),  
           vertical=TRUE,  
           pch=16  
)
```





plot()



plot()

Generic function for plotting of R objects

`plot(x, y, ...)`

x

the x coordinates

y

the y coordinates

main

an overall title for the plot

sub

a sub title for the plot

xlab

a title for the x axis

ylab

a title for the y axis

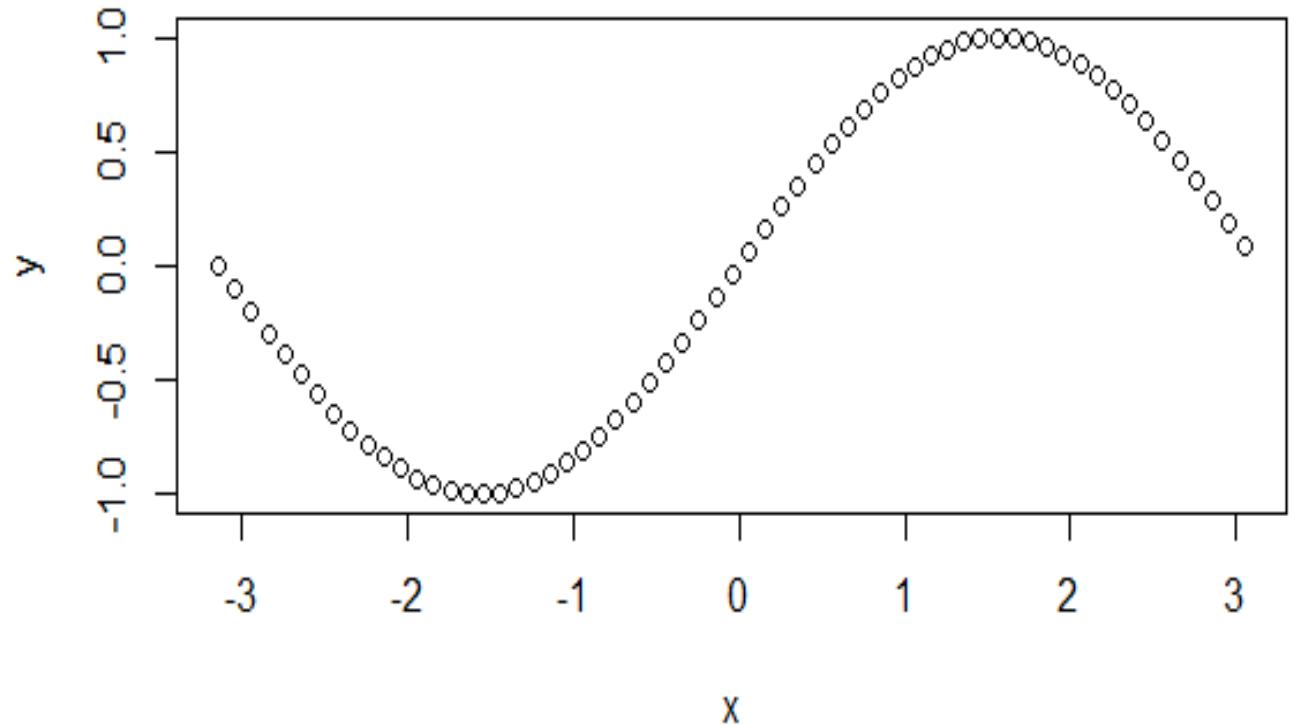
type

"p" for points,
"l" for lines,
"b" for both,
"c" for the lines part alone of "b",
"h" for 'histogram' like (or 'high-density') vertical lines,
"s" for stair steps,
"S" for other steps, see 'Details' below,
"n" for no plotting.
....



Simple Case

```
> x <- seq(-pi,pi,0.1)  
> plot(x, sin(x))
```

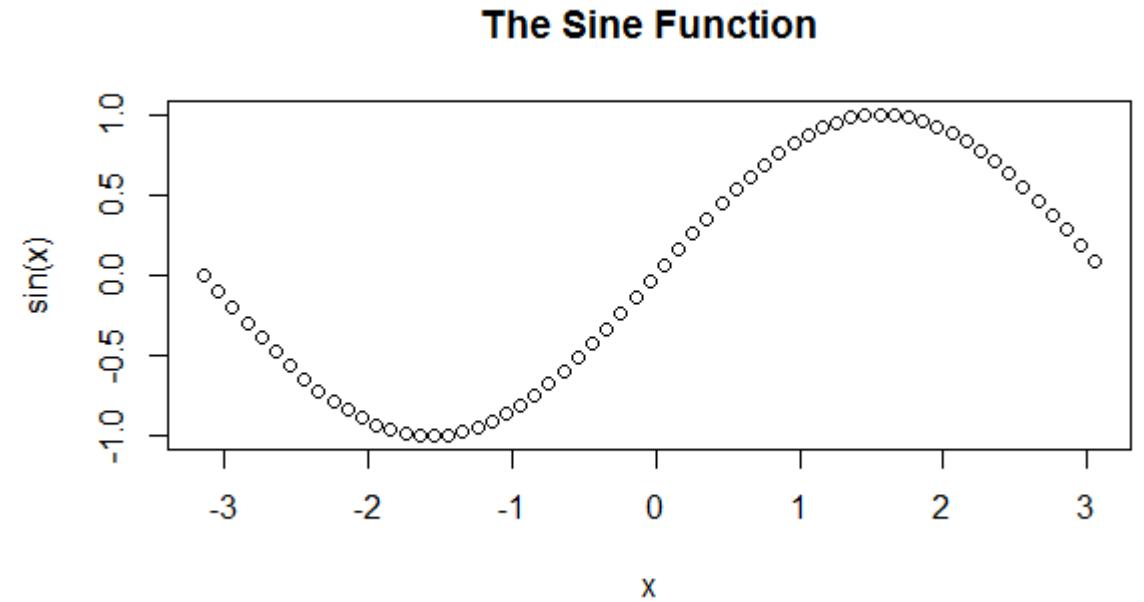




Add Label

Add label using parameter main

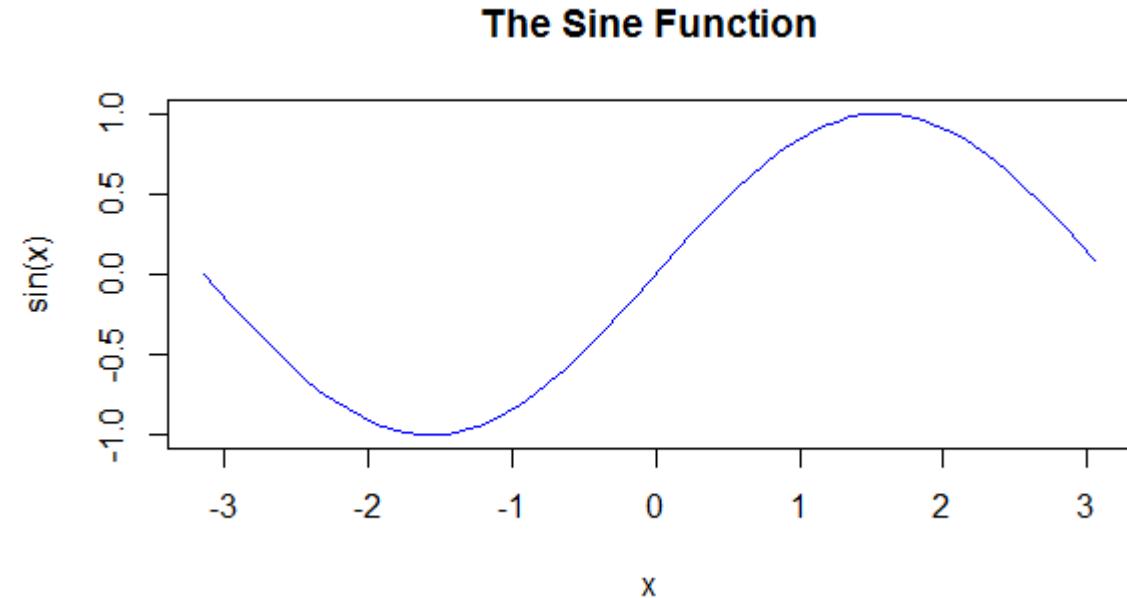
```
> plot(x, sin(x),  
      main="The Sine Function",  
      ylab="sin(x)")
```





Changing Color and Plot Type

```
> plot(x, sin(x),  
       main="The Sine Function",  
       ylab="sin(x)",  
       type="l",  
       col="blue")
```





Changing Color and Plot Type

"p" - points

"l" - lines

"b" - both points and lines

"c" - empty points joined by lines

"o" - overplotted points and lines

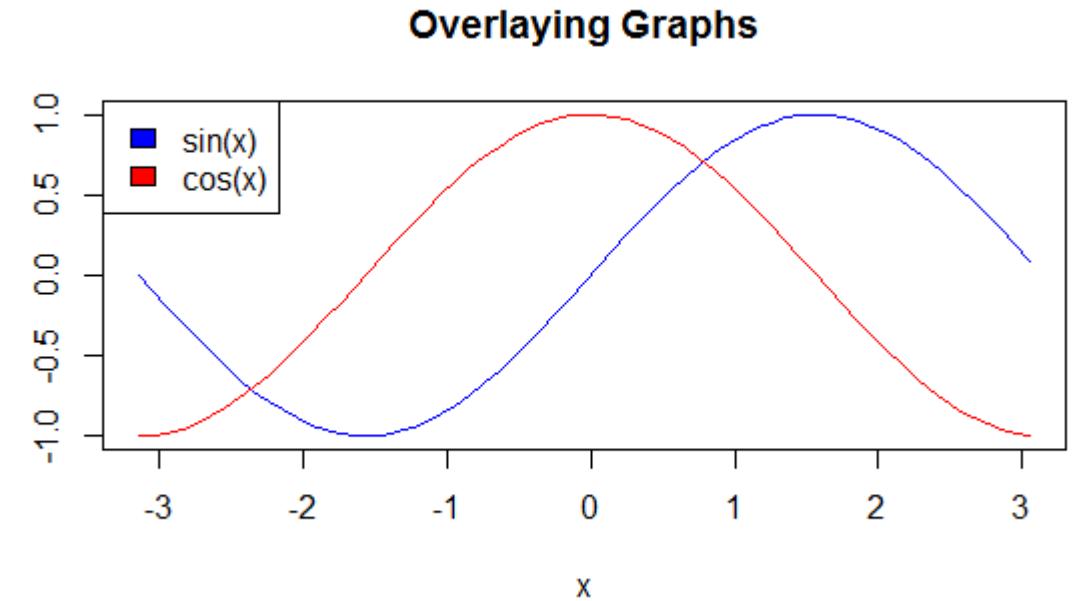
"s" and "S" - stair steps

"h" - histogram-like vertical lines

"n" - does not produce any points or lines

Overlaying Plots

```
> plot(x, sin(x),  
       main="Overlaying Graphs",  
       ylab="",  
       type="l",  
       col="blue")  
lines(x,cos(x), col="red")  
legend("topleft",  
      c("sin(x)","cos(x)"),  
      fill=c("blue","red"))  
)
```





Parameters

Par() function inquires and sets the parameters

```
> par()
```

```
$xlog[1]
```

```
FALSE
```

```
$ylog[1]
```

```
FALSE
```

```
$adj
```

```
[1] 0.5
```

```
$ann
```

```
[1]
```

```
.....
```



Multiple Graphs

```
> max.temp
```

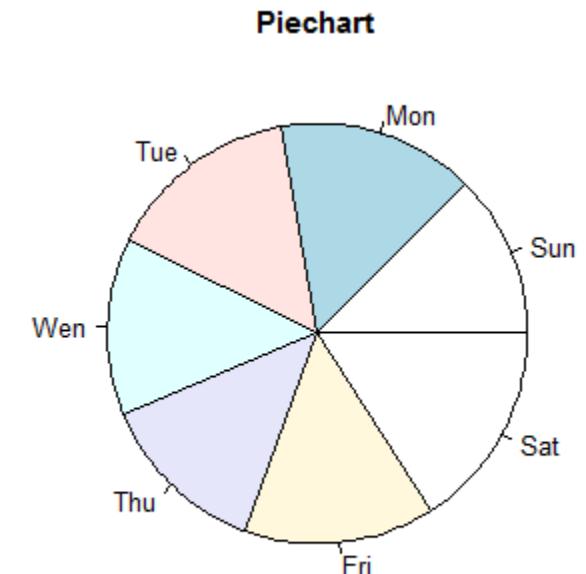
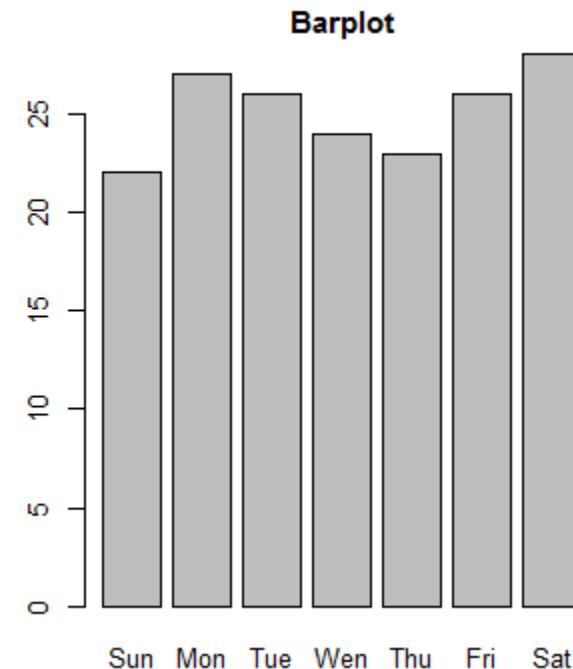
```
[1] 22 27 26 24 23 26 28
```

```
# # set the plotting area into a 1 x 2 array
```

```
> par(mfrow=c(1,2))
```

```
> barplot(max.temp, main="Barplot")
```

```
> pie(max.temp, main="Piechart", radius=1)
```





2 x 2 Graphs

```
# Prepare Data
```

```
> Temperature <- airquality$Temp  
> Ozone <- airquality$Ozone
```

```
# set the plotting area into a 1*2 array
```

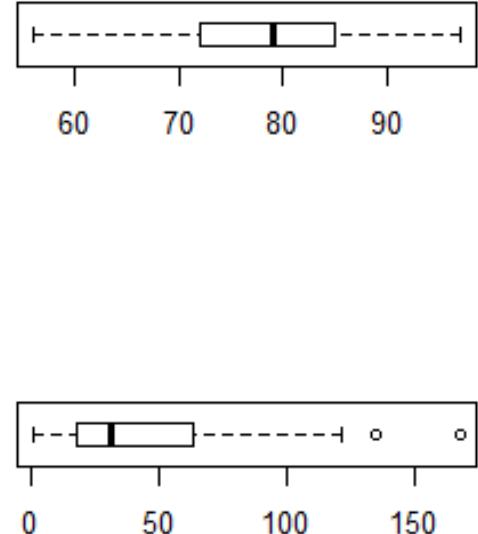
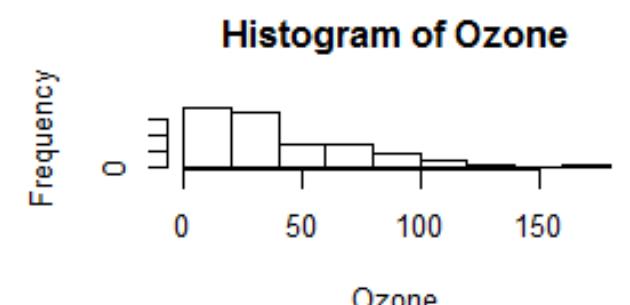
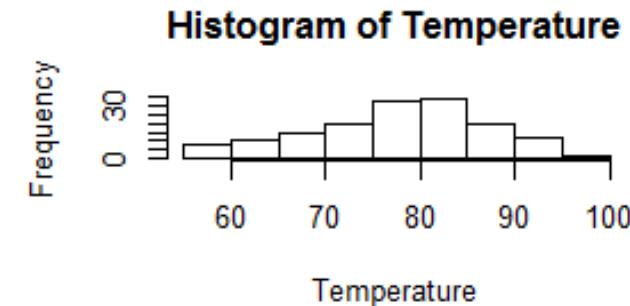
```
> par(mfrow=c(2,2))
```

```
> hist(Temperature)
```

```
> boxplot(Temperature, horizontal=TRUE)
```

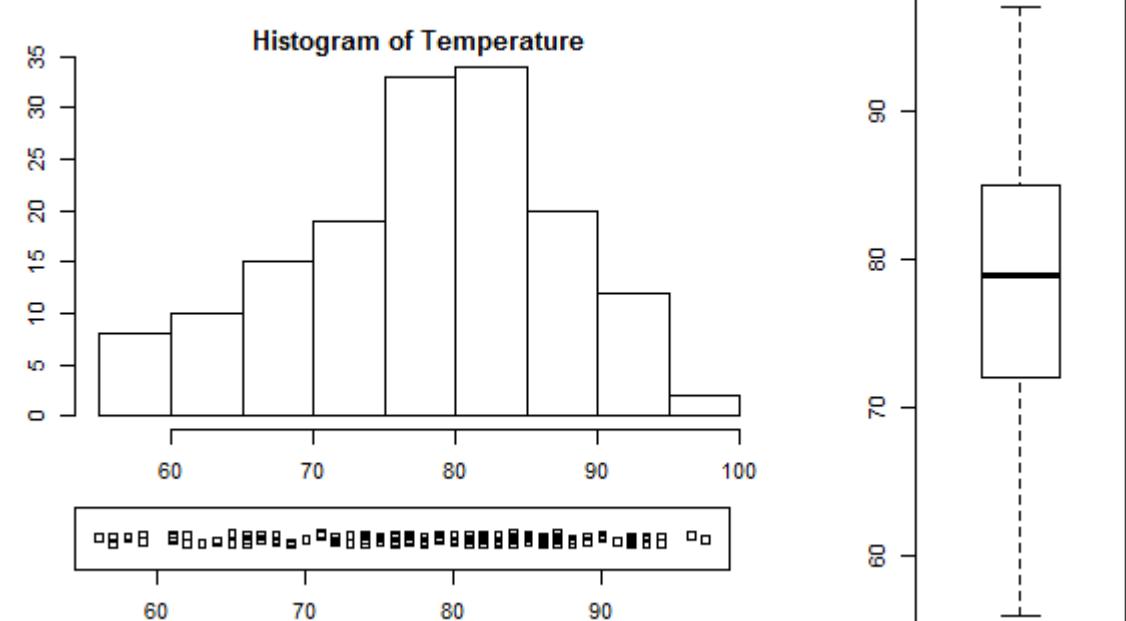
```
> hist(Ozone)
```

```
> boxplot(Ozone, horizontal=TRUE)
```



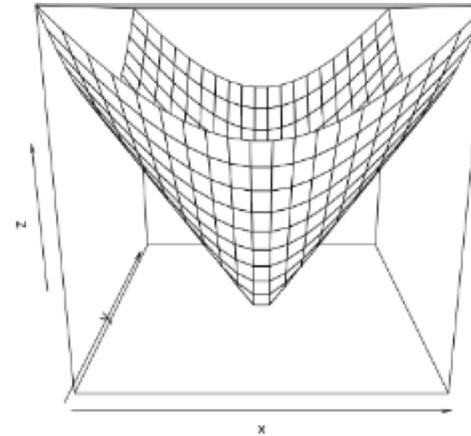
Precise Control

```
# make labels and margins smaller  
> par(cex=0.7, mai=c(0.1,0.1,0.2,0.1))  
> Temperature <- airquality$Temp  
# define area for the histogram  
> par(fig=c(0.1,0.7,0.3,0.9))  
> hist(Temperature)  
# define area for the boxplot  
> par(fig=c(0.8,1,0,1), new=TRUE)  
> boxplot(Temperature)  
# define area for the stripchart  
> par(fig=c(0.1,0.67,0.1,0.25), new=TRUE)  
> stripchart(Temperature, method="jitter")
```



3D Plot

```
> cone <- function(x, y){  
  sqrt(x^2+y^2)  
}  
  
> x <- y <- seq(-1, 1, length= 20)  
> z <- outer(x, y, cone)  
> persp(x, y, z)
```





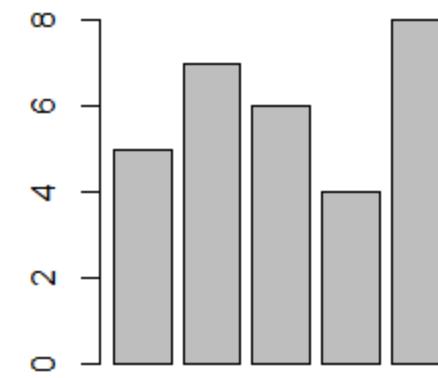
Change Color



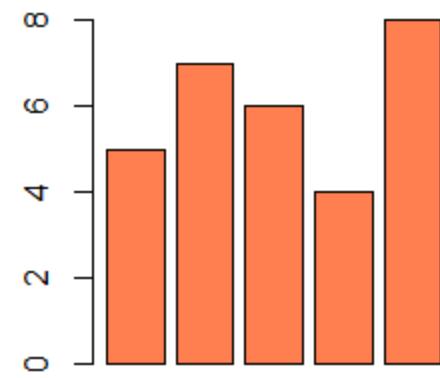
R Plot Color

```
> temp <- c(5,7,6,4,8)  
> barplot(temp, main="By default")  
> barplot(temp, col="coral", main="With coloring")
```

By default



With coloring





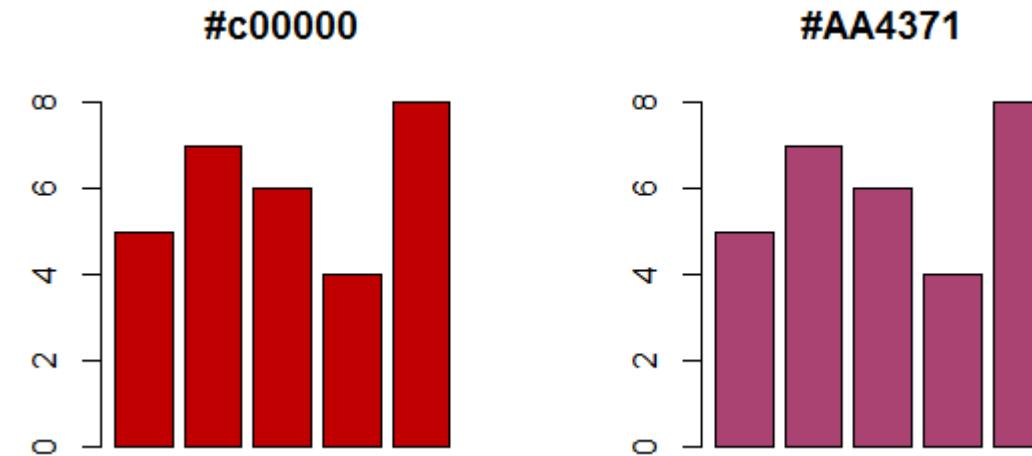
Using Color Names

```
> colors()  
[1] "white"          "aliceblue"        "antiquewhite"  
[4] "antiquewhite1"   "antiquewhite2"    "antiquewhite3"  
[7] "antiquewhite4"   "aquamarine"       "aquamarine1"  
...  
[655] "yellow3"       "yellow4"         "yellowgreen"
```



Using Hex Values

```
> barplot(temp, col="#c00000", main="#c00000")
> barplot(temp, col="#AA4371", main="#AA4371")
```





Save to a File



Save as jpeg

```
> Temperature <- airquality$Temp
```

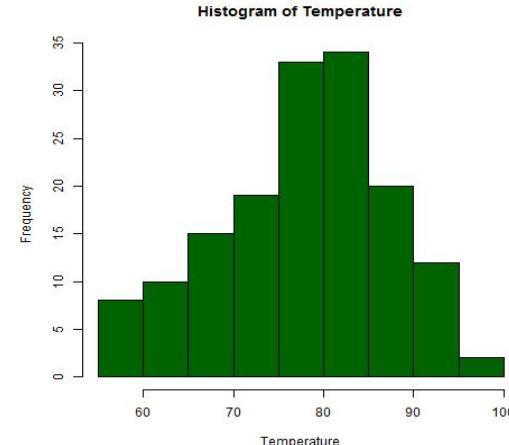
```
# to show on a screen
```

```
> hist(Temperature, col="darkgreen")
```

```
#to save as a jpeg file jpeg(file="saving_plot1.jpeg")
```

```
> hist(Temperature, col="darkgreen")
```

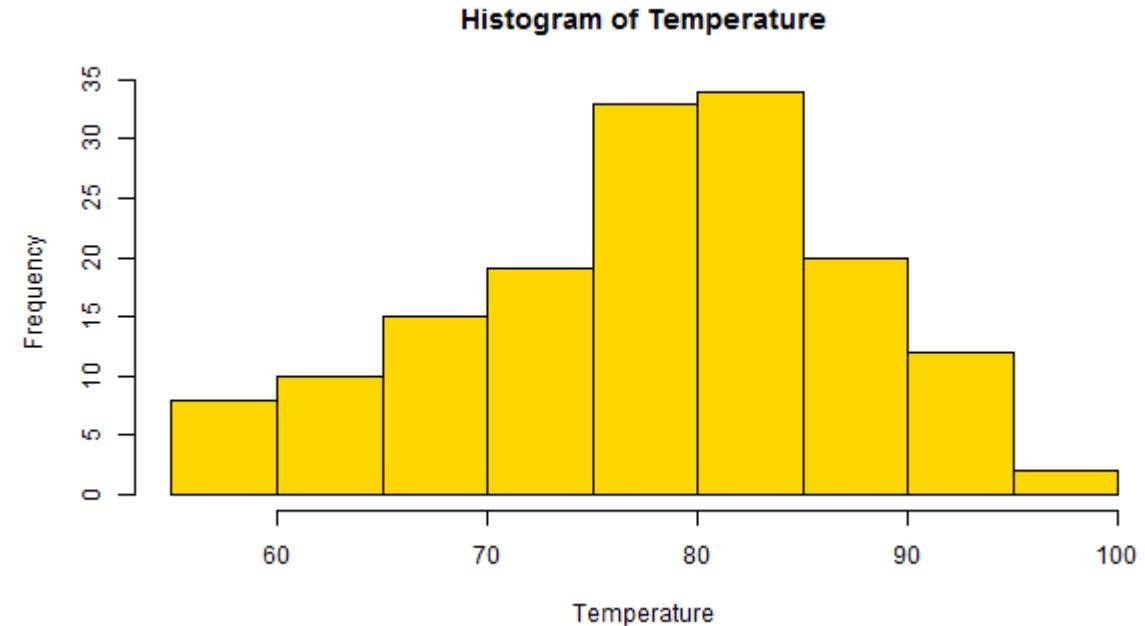
```
> dev.off()
```





Save as png

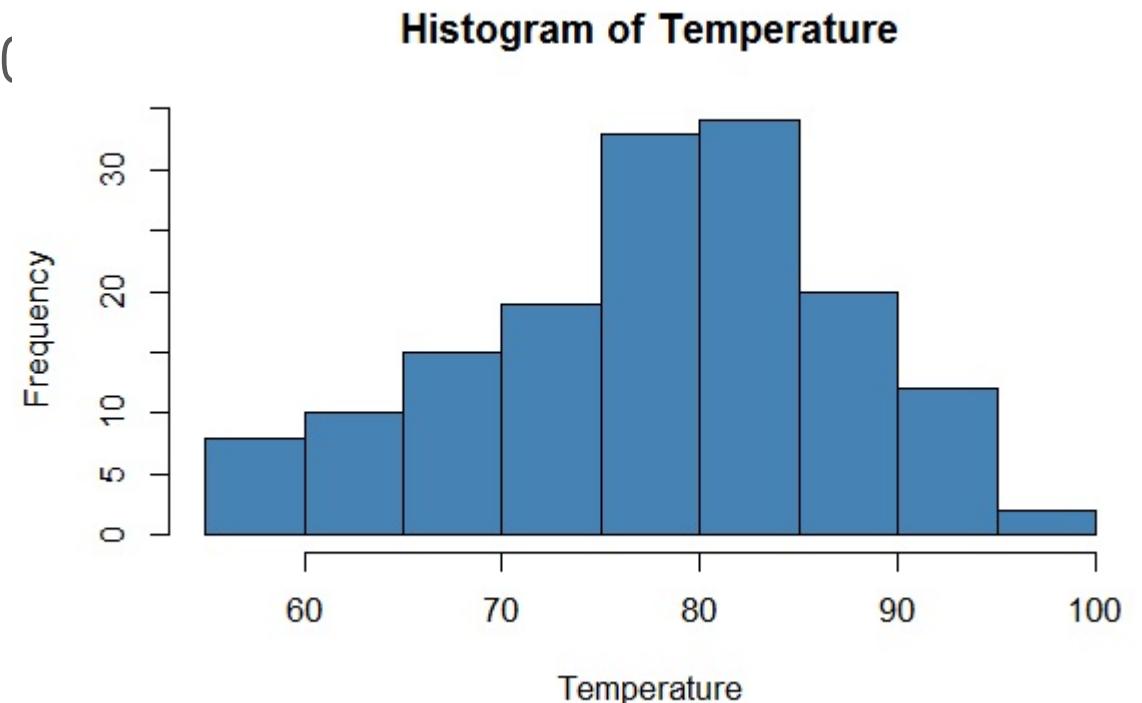
```
> png(file="C:/Datamentor/R-tutorial/saving_plot2.png",  
      width=600, height=350)  
> hist(Temperature, col="gold")  
> dev.off()
```





Save as bmp

```
> bmp(file="saving_plot3.bmp",
      width=6, height=4, units="in", res=100)
> hist(Temperature, col="steelblue")
> dev.off()
```





Save as pdf

```
> pdf(file="saving_plot4.pdf")
> hist(Temperature, col="violet")
> dev.off()
```



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Thank You