Lab 1

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1 Basic Command

```
6+3
```

```
## [1] 9
```

```
6*3
```

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

```
6-3
```

```
## [1] 3
```

```
6/9
```

```
## [1] 0.6666667
```

```
sqrt(25)
```

```
## [1] 5
```

```
log(10)
```

```
## [1] 2.302585
```

2 Creating Vector

```
eyec1 = c("Green", "Brown", "Hazel", "Brown", "Gray")
GPA1 = c(2.5, 3, 3.8, 2.7, 3.2, 3.5)
```

3 Vector Subscripting

```
x<-c(34,56,76,43)
x[c(4,1,4)]
```

```
## [1] 43 34 43
```

4 Vector Operation

```
x <- c(10,5,3,6)
z <- c(7,8,9,2)
y1 = x + 3
y2 = x + z
x*z
```

```
## [1] 70 40 27 12
```

```
z/x
```

```
## [1] 0.7000000 1.6000000 3.0000000 0.3333333
```

5 creating Matrix

```
mat <- matrix(data = GPA1, nrow = 2, ncol = 3, byrow = TRUE)
mat
```

```
##      [,1] [,2] [,3]
## [1,]  2.5  3.0  3.8
## [2,]  2.7  3.2  3.5
```

6 creating data frame

```
Number<-c(1,2,3,4)
Diet<-c("Poor","Poor","Good","Good")
Sex<-c("M","F","M","F")
Weight<-c(156,180,167,190)
Fat.content<-c(34,43,40,43)
Morph<-c("Winged","Winged","Wingless","Intermediate")

cricket_dat<-data.frame(Number, Diet, Sex,
                        Weight, Fat.content, Morph)
cricket_dat
```

```
##   Number Diet Sex Weight Fat.content        Morph
## 1      1 Poor   M    156          34       Winged
## 2      2 Poor   F    180          43       Winged
## 3      3 Good   M    167          40     Wingless
## 4      4 Good   F    190          43 Intermediate
```

```
names(cricket_dat)<-c("No","Diet","Gender",
                      "WT","FC", "Morph")
head(cricket_dat)
```

```
##   No Diet Gender  WT FC        Morph
## 1  1 Poor      M 156 34       Winged
## 2  2 Poor      F 180 43       Winged
## 3  3 Good      M 167 40     Wingless
## 4  4 Good      F 190 43 Intermediate
```

7 Extracting Vectors

```
GPA1 = c(2.5, 3, 3.8, 2.7, 3.2)
eyec1 = c("Green", "Brown", "Hazel", "Brown", "Gray")
interest1 = c(2, 5, 4, 4, 3)
mydata1 = data.frame(GPA = GPA1, eye.color = eyec1, interest = interest1)

mydata1$eye.color
```

```
## [1] "Green" "Brown" "Hazel" "Brown" "Gray"
```

```
mydata1$GPA1 < 3
```

```
## logical(0)
```

8 Data Manipulation

8.1 Filtering

```
good_diet_data <- cricket_dat[cricket_dat$Diet == "Good", ]
print("Data for Good Diet:")
```

```
## [1] "Data for Good Diet:"
```

```
print(good_diet_data)
```

```
##   No Diet Gender  WT FC        Morph
## 3  3 Good      M 167 40     Wingless
## 4  4 Good      F 190 43 Intermediate
```

8.2 Select rows where Weight is greater than 170

```
heavy_weight_data <- cricket_dat[cricket_dat$WT > 170, ]
print("Data for Weight > 170:")
```

```
## [1] "Data for Weight > 170:"
```

```
print(heavy_weight_data)
```

```
##   No Diet Gender  WT FC        Morph
## 2  2 Poor      F 180 43       Winged
## 4  4 Good      F 190 43 Intermediate
```

8.3 Subsetting

```
## Select specific columns (e.g., No and Morph)
subset_data <- cricket_dat[, c("No", "Morph")]
print("Subset of Data with No and Morph:")
```

```
## [1] "Subset of Data with No and Morph:"
```

```
print(subset_data)
```

```
##   No        Morph
## 1  1       Winged
## 2  2       Winged
## 3  3     Wingless
## 4  4 Intermediate
```

8.4 Creating New Variables

```
## Calculate BMI (Body Mass Index)
cricket_dat$BMI <- cricket_dat$WT / ((cricket_dat$FC / 100)^2)
print("Data with BMI:")
```

```
## [1] "Data with BMI:"
```

```
print(cricket_dat)
```

```
##   No Diet Gender  WT FC        Morph       BMI
## 1  1 Poor      M 156 34       Winged 1349.4810
## 2  2 Poor      F 180 43       Winged  973.4992
```

```
## 3  3 Good      M 167 40     Wingless 1043.7500
## 4  4 Good      F 190 43 Intermediate 1027.5825
```

8.5 saving data frame

```
write.csv(cricket_dat, "cricket.csv")
```

9 Apply Function

```
my_matrix <- matrix(c(1, 2, 3, 4, 5, 6, 7, 8, 9), nrow = 3, byrow = TRUE)
my_matrix
```

```
##      [,1] [,2] [,3]
## [1,]    1    2    3
## [2,]    4    5    6
## [3,]    7    8    9
```

```
column_means <- apply(my_matrix, 2, mean)
column_means
```

```
## [1] 4 5 6
```

```
row_means <- apply(my_matrix, 1, mean)
row_means
```

```
## [1] 2 5 8
```

10 Tapply Function

```
ID <- 1:10
marks <- c(22,23,20,17,15,11,20,15,17,19)
sex<-c("f","m","m","f","m","f","f","m","m","m")
df <- data.frame(ID, marks, sex)
tapply(df$marks, df$sex, mean)
```

```
##        f        m
## 17.50000 18.16667
```

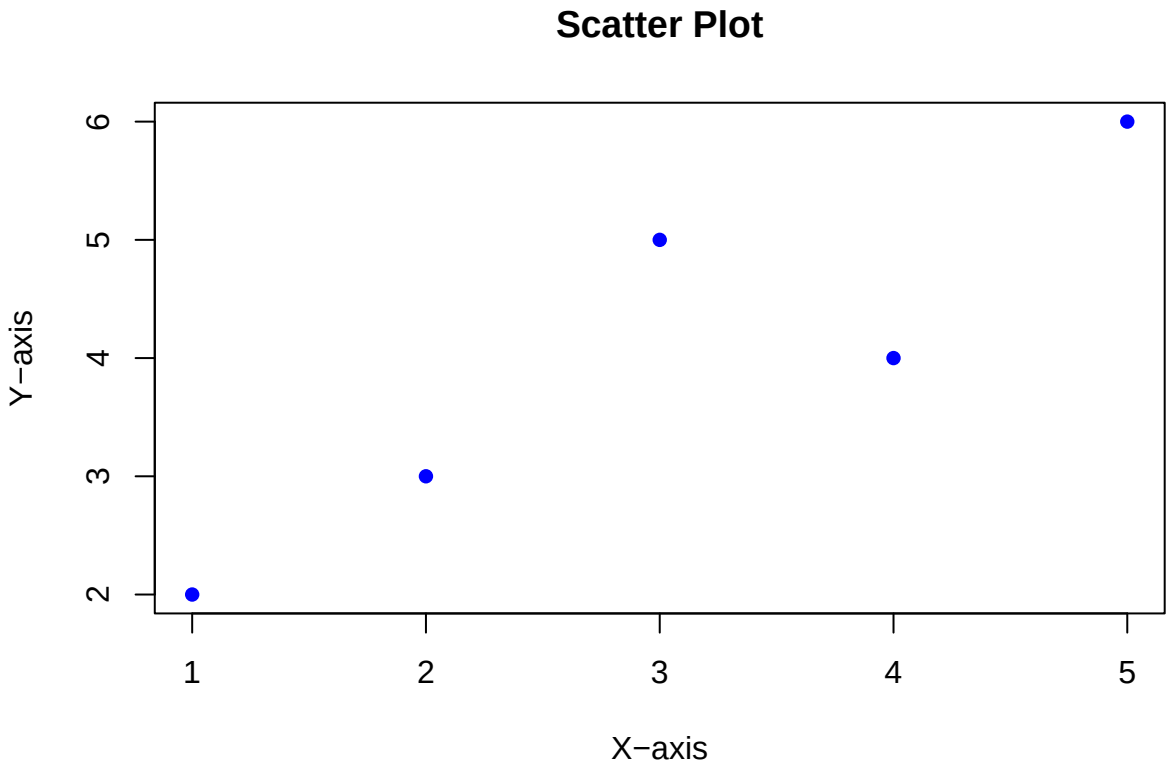
11 Descreptive Statistics

```
my_data <- c(15, 20, 25, 30, 35, 40, 45, 50, 55, 60)
mean_value <- mean(my_data)
median_value <- median(my_data)
variance_value <- var(my_data)
sd_value <- sd(my_data)
```

12 Graphics

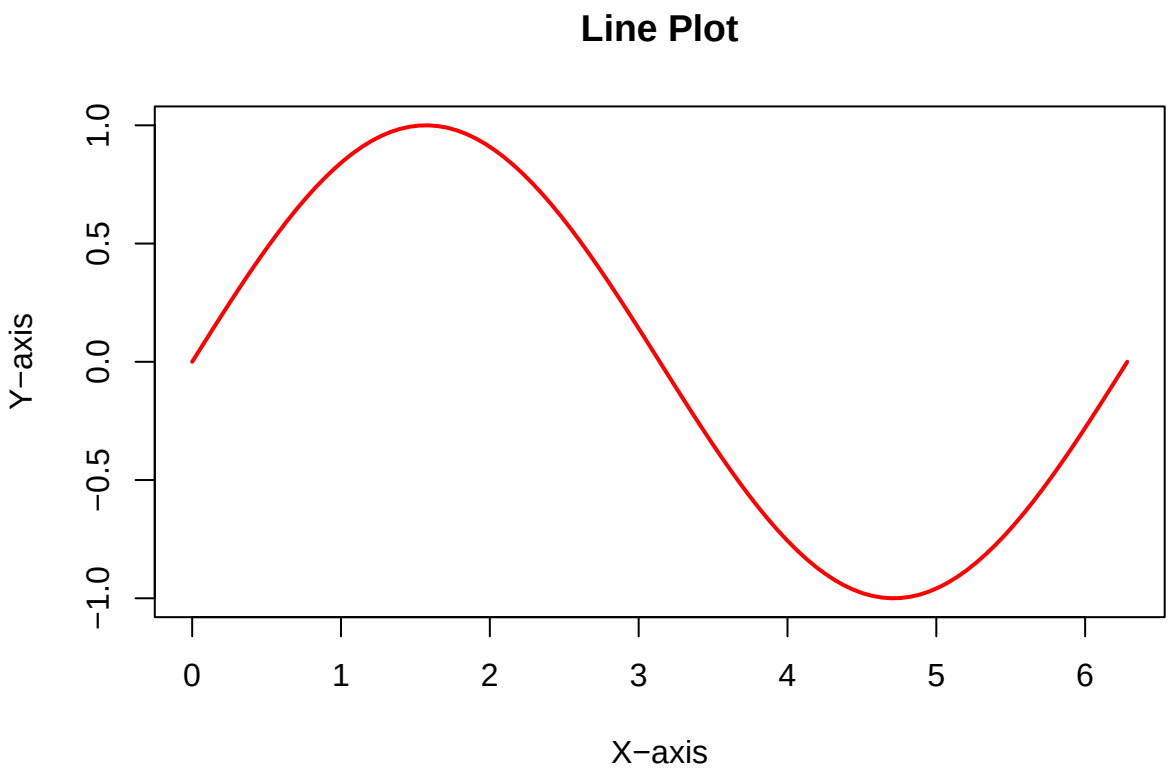
12.1 Scatter

```r
x <- c(1, 2, 3, 4, 5)
y <- c(2, 3, 5, 4, 6)
plot(x, y, main="Scatter Plot", xlab="X-axis", ylab="Y-axis", col="blue", pch=16)
```



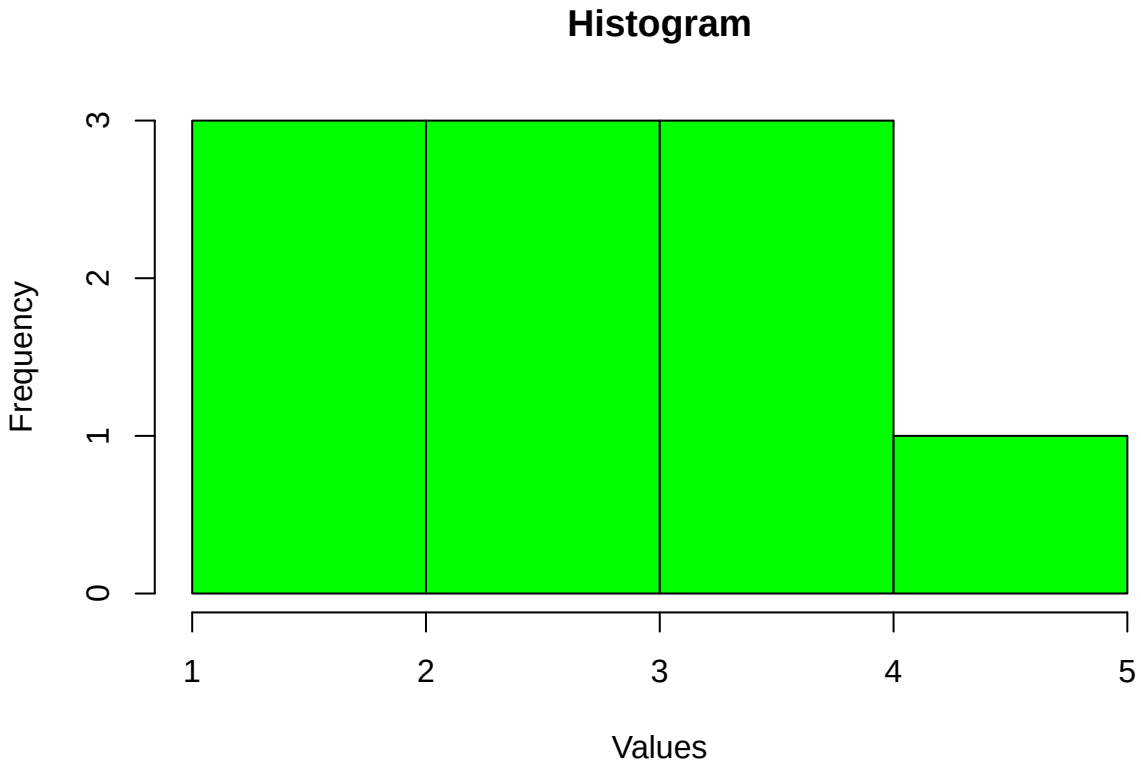
12.2 Line Plot

```r
x <- seq(0, 2*pi, length.out=100)
y <- sin(x)
plot(x, y, type="l", main="Line Plot", xlab="X-axis", ylab="Y-axis", col="red", lwd=2)
```



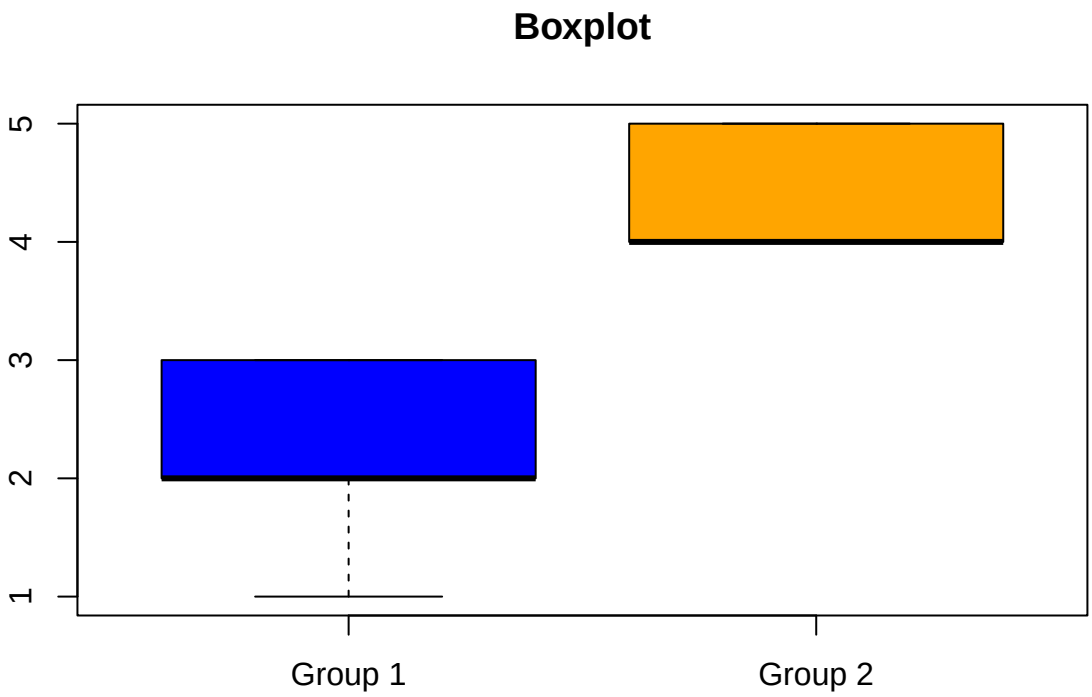
12.3 Histogram

```
data <- c(1, 2, 2, 3, 3, 3, 4, 4, 4, 5)
hist(data, main="Histogram", xlab="Values", col="green", border="black")
```



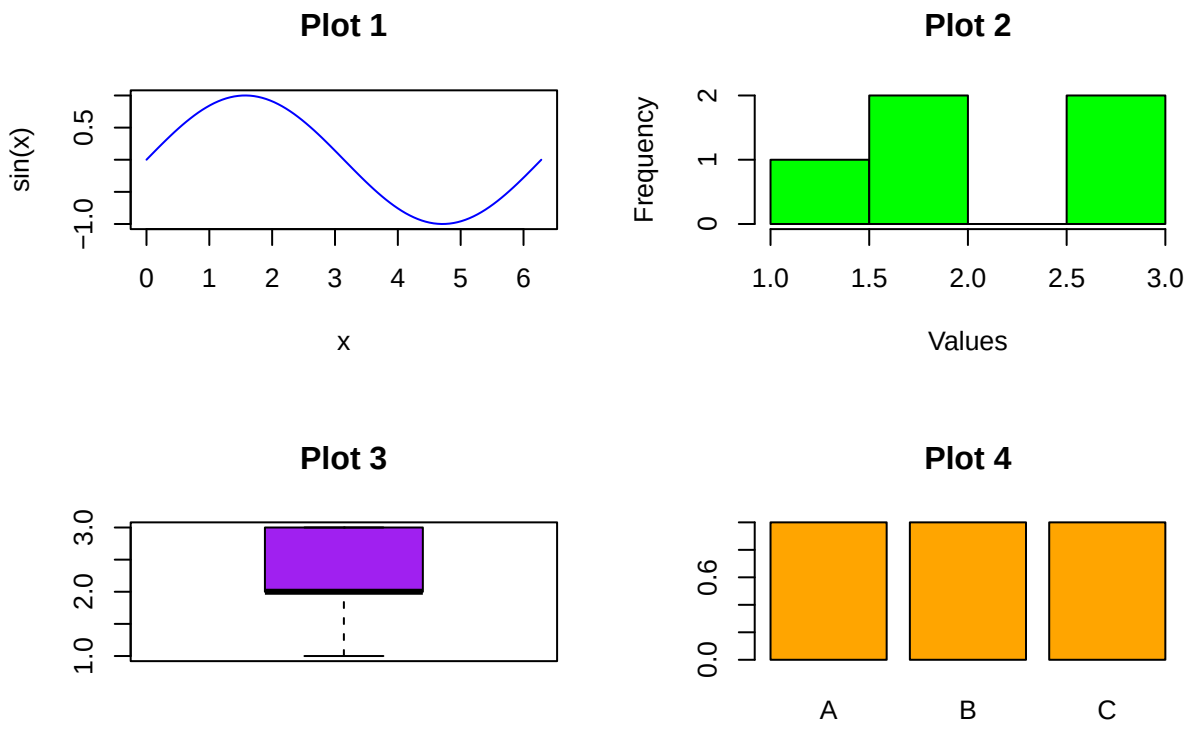
12.4 Boxplot

```
group1 <- c(1, 2, 2, 3, 3)
group2 <- c(4, 4, 4, 5, 5)
boxplot(group1, group2, names=c("Group 1", "Group 2"), col=c("blue", "orange"), main="Boxplot")
```



12.5 Multiple Plots

```
par(mfrow=c(2, 2))  # 2x2 layout
plot(x, sin(x), main="Plot 1", type="l", col="blue")
hist(c(1, 2, 2, 3, 3), main="Plot 2", xlab="Values", col="green", border="black")
boxplot(c(1, 2, 2, 3, 3), main="Plot 3", col="purple")
barplot(table(c("A", "B", "C")), main="Plot 4", col="orange")
```


Plot 1
sin(x)
−1.0
0.5
0
1
2
3
4
5
6
x
Plot 2
Frequency
0
1
2
1.0
1.5
2.0
2.5
3.0
Values
Plot 3
1.0
2.0
3.0
Plot 4
0.0
0.6
A
B
C