1. Write a R program that includes various data types in R.

```
n <- 42.5
cat("Numeric Variable:", n, "\n")
i <- 10L
cat("Integer Variable:", i, "\n")
s <- "Hello, R!"
cat("Character Variable:", s, "\n")
l <- TRUE
cat("Logical Variable:", l, "\n")
cplx <- 2 + 3i
cat("Complex Variable:", cplx, "\n")
f <- factor(c("Low", "High", "Medium", "Low", "High"))
cat("Factor Variable:", f, "\n")
v <- c(1, 2, 3, 4, 5)
cat("Numeric Vector:", v, "\n")
m <- matrix(c(1, 2, 3, 4), nrow = 2, ncol=2)
cat("Matrix:\n")
print(m)
list1 <- list(n, s, l)
cat("List Variable:\n")
print(list1)
df <- data.frame(
  Name = c("Alice", "Bob", "Charlie"),
  Age = c(25, 30, 35),
  Employed = c(TRUE, FALSE, TRUE)
)
cat("Data Frame\n")
print(df)
```

2. Write a R program that includes various looping statements.

```
 cat("For Loop\n")
for (i in 1:5){
  cat("Iteration", i, ": ", i^2, "\n")
}
cat("While Loop\n")
count <- 1
```

```
while (count <= 5) {
  cat("Iteration", count, ": ", count^2, "\n")
  count <- count + 1
}
cat("Repeat Loop\n")
count<-1
repeat {
    cat("Iteration", count, ": ", count^2, "\n")
  count <- count + 1
  if (count > 5) {
  break
}
}
```

3. Write a R Program to implement various Statistical Functions in R.

```
d1 <- c(15, 20, 35, 40, 50, 60, 65, 80, 85, 100)
m <- mean(d1)
med <- median(d1)
v <- var(d1)
s <- sd(d1)
r <- range(d1)
mn <- min(d1)
mx <- max(d1)
q <- quantile(d1)
cat("Data=",d1,"\n")
cat("mean=",m,"\n")
cat("Median",med,"\n")
cat("variance=",v,"\n")
cat("Standard Deviations", s,"\n")
cat("Range(Minimum & Maximum Value=",r,"\n")
cat("Minimum=",mn,"\n")
cat("Maximum=",mx,"\n")
cat("Quantile=",q,"\n")
```

4. Write a R program for different types of data structures (Array, Matrix, Data frame) in R

```
m <- matrix(1:9, nrow = 3, ncol = 3)
cat("Matrix (3x3):\n")
print(m)
```

```
a <- array(1:12, dim = c(2, 3, 2))
cat("Array (2x3x2):\n")
print(a)
df1 <- data.frame(
  name = c("Alice", "Bob", "Charlie"),
  age = c(25, 30, 35),
  emp = c(TRUE, FALSE, TRUE)
)
cat("Data Frame:\n")
print(df1)
```

5. Write a R program to take input from the user name, age, address, city, state) and display the values

```
name <- readline(prompt = "Enter your name: ")
age <- as.numeric(readline(prompt = "Enter your age: "))
address <- readline(prompt = "Enter your address: ")
city <- readline(prompt = "Enter your city: ")
state <- readline(prompt = "Enter your state: ")
Leenacat("Name:", name, "\n")
cat("Age:", age, "\n")
cat("Address:", address, "\n")
cat("City:", city, "\n")
cat("State:", state, "\n")
```

6. Write a R program for calculating cumulative sums, products, minima & maxima

```
v <- c(1, 2, 3, 4, 5)
s <- cumsum(v)
cat("Cumulative Sum:", s, "\n")
p <- cumprod(v)
cat("Cumulative Product:", p, "\n")
min_v <- min(v)
max_v <- max(v)
cat("Minimum Value:", min_v, "\n")
cat("Maximum Value:", max_v, "\n")
```

7. Write a R program that includes different operators (Arithmetic, Logical, Relational).

```
a<- 10
b<- 3
cat("a + b", a+b,"\n")
cat("a - b", a-b,"\n")
cat("a * b", a*b,"\n")
cat("a / b", a/b,"\n")
cat("a  %% b", a%%b,"\n")
cat("a == b", a==b,"\n")
cat("a != b", a!=b,"\n")
cat("a > b", a>b,"\n")
cat("a < b", a<b,"\n")
cat("a >= b", a>=b,"\n")
cat("a <= b", a<=b,"\n")
x <- c(3,1,TRUE,2+3i)
y <- c(4,1,FALSE,2+3i)
cat("x & y", x&y,"\n")
cat("x | y", x|y,"\n")
cat("!x", !x,"\n")
```

8. **Write R program to find Correlation and Covariance.**

```
d1 <- c(10, 20, 30, 40, 50)
d2 <- c(5, 15, 25, 35, 45)
cor_val <- cor(d1, d2)
cat("Corelation",cor_val,"\n")
cov_val <- cov(d1, d2)
cat("Covariance",cov_val,"\n")
```

9. **Write a R program to define colors in various ways. (Use of named colors, RGB colors, hexadecimal color codes, and the colors()).**

```
barplot(   rep(1, 5),   col = c("skyblue", rgb(0, 128, 255, maxColorValue =
255), "#FF5733", "green", "yellow"),   main = "Color Display"
)
```

10. **Write a R program with any dataset containing data frame objects, indexing, and subsetting data frames.**

```
d <- data.frame(
  name = c("Alice", "Bob", "Charlie", "David", "Eve"),
  age = c(25, 30, 22, 28, 35),
  city = c("New York", "San Francisco", "Los Angeles", "Chicago", "Miami")
)
print(d)
print(d[2, 1])
print(d[3, ])
print(d$city)
print(d[, "city"])
print(d[c(1, 4), ])
print(d[, c("name", "age")])
print(d[d$age < 30, ])
```

11. **Write a R program for different types of data structures (Vectors, List, Factor) in R**

```
v1 <- c(10, 20, 30, 40, 50)
v2 <- c("Apple", "Banana",  "Cherry")
v3 <- c(TRUE, FALSE, TRUE)
print(v1)
print(v2)
print(v3)
l <- list(v1, v2, v3)
print(l)
f <- factor(c("Low", "Medium", "High", "Low", "High"))
print(f)
```

12. Write a R program that includes linear algebra operations on vectors

```
v1 <- c(1, 2, 3)
v2 <- c(4, 5, 6)
add_v <- v1 + v2
cat("Vector Addition:", add_v, "\n")
sub_v <- v1 - v2
cat("Vector Subtraction:", sub_v, "\n")
dot_prod <- sum(v1 * v2)
```

```
cat("Dot Product:", dot_prod, "\n")
scalar_mul<-2*v1
cat("Scalar Multiplication:", scalar_mul, "\n")
```

13. Write a R program for visual representation of object with graphs using graph function (pie, barplot, boxplot).

```
d <- c(23, 45, 56, 32, 67, 89, 55, 43, 78, 36, 49, 60, 70)
barplot(d, col = "orange", xlab = "Index", ylab = "Value", main = "Bar Chart")
p <- c(20, 30, 40, 10)
pie(p, labels = c("A", "B", "C", "D"), col = rainbow(length(p)), main = "Pie Chart")
boxplot(d, col = "lightgreen", xlab = "Value", main = "Box Plot")
```

14. Write a R program to create a simple for loop

```
print("prints the for loop using break statements")
for (x in c(2,3,4,0,6,7))
{
  if(x==0)
  {
    break
  }
  print(x)
}
print("end of loop")
print("prints the for loop using next statements")
for(x in c(2,3,4,0,6,7))
{
  if(x==0)
  {
    next
  }
  print(x)
}
print("end of loop")
```

15. Write a R program to create a simple while loop

```
a <- 1
sum<-0
```

```
while (a <= 5){
  print(a)
  sum<-sum+a
  a <- a + 1
}
cat("sum=",sum)
```

16. Write a R program to create vector using different vector functions.

```
x<-c(2,3,4,5,6,7)
cat('using c functon',x,'\n')
z<-2:9
cat('using colon',z,'\n')
y<- seq(1,10,by=2)
cat('using seq() function',y,'\n')
len=length(y)
 cat('Length of vector y=',len,'\n')
```

17. Write a R program for visual representation of object with graphs using graph function (hist, line plot, scatter plot).

```
d <- c(23, 45, 56, 32, 67, 89, 55, 43, 78, 36, 49, 60, 70)
plot(d, type = "l", col = "blue", xlab = "X", ylab = "Y", main = "Line Chart")
hist(d, col = "lightblue", xlab = "Value", ylab = "Frequency", main =
"Histogram")
x <- c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
y <- c(2, 4, 5, 7, 8, 10, 11, 14, 15, 17)
plot(x, y, col = "red", xlab = "X", ylab = "Y", main = "Scatter Plot")
```

18. Write a R program that includes various if statements.

```
x <- 10
y <- 100
if (x > y){
  cat("x is greater than y\n")
}else if (x < y) {
  cat("x isless than y\n")
} else {
  cat("x is equal to y\n")
```

}

19.Write a program to create an any application of Linear Regression

```
x <- c(2, 3, 5, 7, 9)   # Independent variable
y <- c(4, 5, 7, 10, 15) # Dependent variable
# Combine into a data frame
data <- data.frame(x, y)
# Display the dataset
print("Data:")
print(data)
# Build the model
model <- lm(y ~ x, data = data)
print(model)
# Display the model summary
print(summary(model))
```

20. Write a R program to perform One-way ANOVA

```
group <- factor(rep(c("A","B","C"), each = 4))
score <- c(8,9,6,7, 5,6,4,5, 9,10,8,9)
df <- data.frame(group, score)
print(df)
# one-way ANOVA
model <- aov(score ~ group, data = df)
print(model)
print("ANOVA TABLE")
print(summary(model))
```