Arithmetic Operations and Mathematical Functions

o Example: Basic Arithmetic Operations

```
# Addition
result_add <- 5 + 3
cat("Addition:", result_add, "\n")
# Subtraction
result_sub <- 7 - 2
cat("Subtraction:", result_sub, "\n")
# Multiplication
result_mult <- 4 * 6
cat("Multiplication:", result_mult, "\n")
# Division
result_div <- 10 / 2
cat("Division:", result_div, "\n")
```

output:

```
> # Addition
> result_add <- 5 + 3
> cat("Addition:", result_add, "\n")
Addition: 8
> # Subtraction
> result_sub <- 7 - 2
> cat("Subtraction:", result_sub, "\n")
Subtraction: 5
> # Multiplication
> result_mult <- 4 * 6
> cat("Multiplication:", result_mult, "\n")
Multiplication: 24
> # Division
> result_div <- 10 / 2
> cat("Division:", result_div, "\n")
Division: 5
```

o Example: Mathematical Functions

 # Square root

```
sqrt_result <- sqrt(25)
cat("Square root:", sqrt_result, "\n")
# Exponential function
exp_result <- exp(2)
cat("Exponential function:", exp_result, "\n")
# Trigonometric functions
sin_result <- sin(pi/2)
cat("Sine of pi/2:", sin_result, "\n")
```

output:

```
sqrt_result <- sqrt(25)
> cat("Square root:", sqrt_result, "\n")
Square root: 5
> # Exponential function
> exp_result <- exp(2)
> cat("Exponential function:", exp_result, "\n")
Exponential function: 7.389056
> # Trigonometric functions
> sin_result <- sin(pi/2)
> cat("Sine of pi/2:", sin_result, "\n")
Sine of pi/2: 1
```

Statistical Functions

o Example: Using Statistical Functions

```
# Generate random data
set.seed(123)
data <- rnorm(100)
# Mean
mean_result <- mean(data)
```

```
cat("Mean:", mean_result, "\n")
# Standard deviation
sd_result <- sd(data)
cat("Standard deviation:", sd_result, "\n")
# Quantiles
quantiles_result <- quantile(data, probs = c(0.25, 0.5, 0.75))
cat("Quantiles (25th, 50th, 75th percentiles):", quantiles_result, "\n")
```

output:

```
> set.seed(123)
> data <- rnorm(100)
> # Mean
> mean_result <- mean(data)
> cat("Mean:", mean_result, "\n")
Mean: 0.09040591
> # Standard deviation
> sd_result <- sd(data)
> cat("Standard deviation:", sd_result, "\n")
Standard deviation: 0.9128159
> # Quantiles
> quantiles_result <- quantile(data, probs = c(0.25, 0.5, 0.75))
> cat("Quantiles (25th, 50th, 75th percentiles):", quantiles_result, "\n")
Quantiles (25th, 50th, 75th percentiles): -0.4938542 0.06175631 0.6918192
```

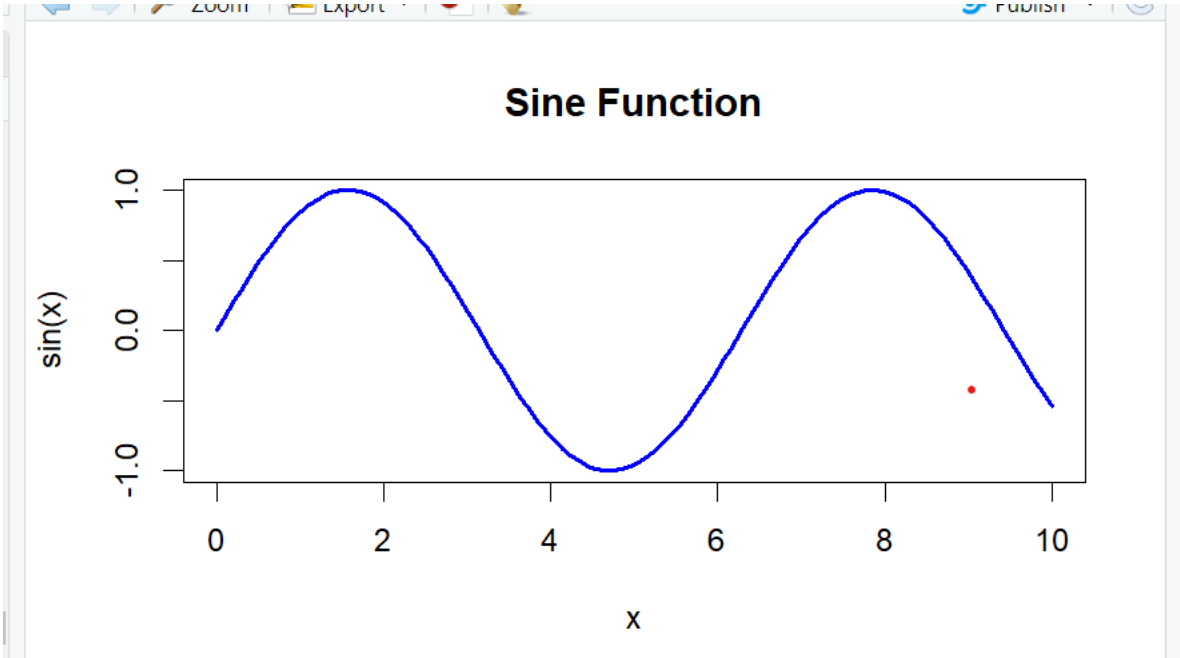
Plotting Data

o Example: Creating Basic Plots

```
# Generate data for plotting
x <- seq(0, 10, length.out = 100)
y <- sin(x)
# Plotting
plot(x, y, type = "l", col = "blue", lwd = 2, main = "Sine Function", xlab = "x",
```

ylab = "sin(x)")

output:



Exercises

1. Exercise 1: Arithmetic Operations

o Task: Perform arithmetic operations to calculate the area of a rectangle with

length 8 units and width 5 units. Print the result.

o Expected Output: Display the calculated area of the rectangle.

```
# Calculate area of rectangle
length <- 8
width <- 5
area <- length * width
# Print result
cat("Area of rectangle:", area, "\n")
```

output:

```
> length <- 8
> width <- 5
> area <- length * width
> # Print result
> cat("Area of rectangle:", area, "\n")
```

Area of rectangle: 40

2. Exercise 2: Mathematical Functions

o Task: Use R functions to calculate the factorial of 6 and the natural logarithm of 10. Print the results.

o Expected Output: Display the factorial and logarithm results.

```
# Calculate factorial and logarithm
factorial_result <- factorial(6)
log_result <- log(10)
# Print results
cat("Factorial of 6:", factorial_result, "\n")
cat("Natural logarithm of 10:", log_result, "\n")
```

output:

```
> factorial_result <- factorial(6)
> log_result <- log(10)
> cat("Factorial of 6:", factorial_result, "\n")
Factorial of 6: 720
> cat("Natural logarithm of 10:", log_result, "\n")
Natural logarithm of 10: 2.302585
```

3. Exercise 3: Statistical Functions and Plotting

o Task: Generate 100 random numbers from a normal distribution with mean 50 and standard deviation 10. Calculate the mean and standard deviation of the generated data. Plot a histogram of the data.

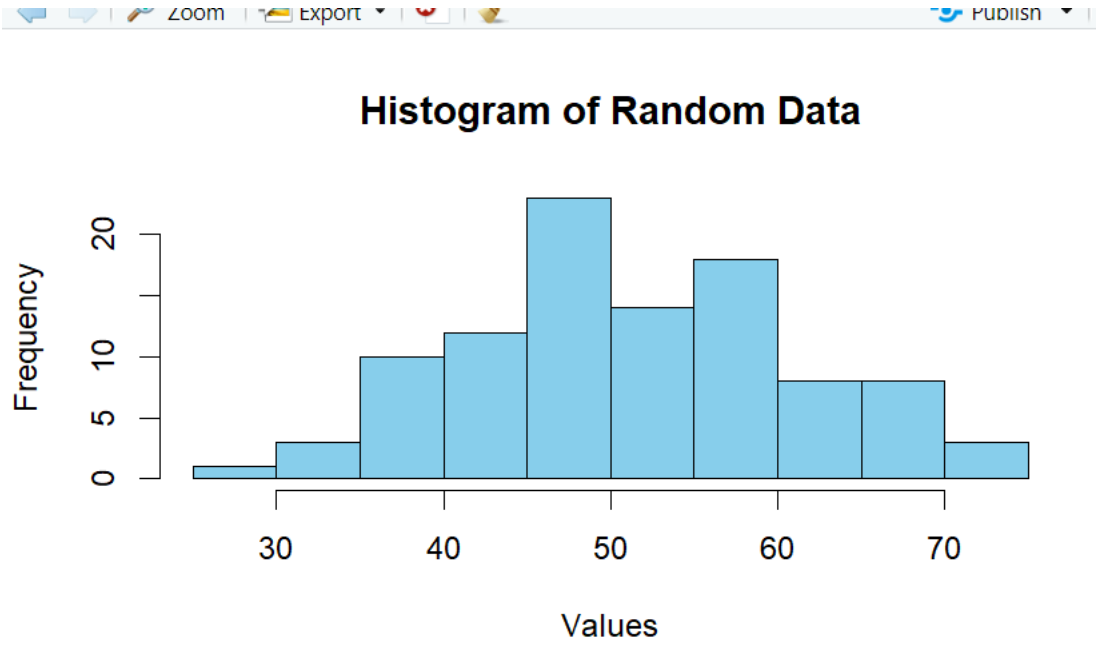
o Expected Output: Display the calculated mean and standard deviation, and visualize the histogram.

```
# Generate random data
set.seed(456)
data <- rnorm(100, mean = 50, sd = 10)
# Calculate mean and standard deviation
```

```
mean_result <- mean(data)
sd_result <- sd(data)
# Print results
cat("Mean:", mean_result, "\n")
cat("Standard deviation:", sd_result, "\n")
# Plot histogram
hist(data, breaks = 10, col = "skyblue", main = "Histogram of Random Data", xlab =
"Values", ylab = "Frequency")
```

Output:

```
> fact<-factorial(5)
> cat(fact,"\n")
120
> l<-log(20)
> cat("log",l,"\n")
log 2.995732
> set.seed(456)
> data <- rnorm(100, mean = 50, sd = 10)
> mean_result <- mean(data)
> sd_result <- sd(data)
> cat("Mean:", mean_result, "\n")
Mean: 51.20575
> cat("sd:", sd_result
```


Zoom
Export
Publish
Histogram of Random Data
Frequency
0
5
10
20
30
40
50
60
70
Values