

```

1 # Function to plot histograms
2 plot_histogram <- function(data, title) {
3   ggplot(data, aes(x = value)) +
4     geom_histogram(binwidth = 1, fill = "skyblue", color = "black", aes(y = ..count../sum(..count..)),
5     labs(title = title, x = "Value", y = "Probability") +
6     theme_minimal()
7 }
8 # Bernoulli Distribution Simulation
9 set.seed(123) # Set seed for reproducibility
10 p <- 0.3 # Probability of success
11 # Generate 1000 samples from Bernoulli distribution
12 bernoulli_samples <- rbinom(1000, 1, p)
13 # Analyze distribution
14 bernoulli_mean <- mean(bernoulli_samples)
15 bernoulli_var <- var(bernoulli_samples)
16 # Plot histogram
17 plot_histogram(data.frame(value = bernoulli_samples), "Bernoulli Distribution")
18
19 # Binomial Distribution Simulation
20 n <- 10 # Number of trials
21 p <- 0.3 # Probability of success
22 # Generate 1000 samples from Binomial distribution
23 binomial_samples <- rbinom(1000, n, p)
24 # Analyze distribution
25 binomial_mean <- mean(binomial_samples)
26 binomial_var <- var(binomial_samples)
27 # Plot histogram
28 plot_histogram(data.frame(value = binomial_samples), "Binomial Distribution")
29
30 # Poisson Distribution Simulation
31 lambda <- 3 # Average rate of events per unit time or space
32 # Generate 1000 samples from Poisson distribution
33 poisson_samples <- rpois(1000, lambda)
34 # Analyze distribution
35 poisson_mean <- mean(poisson_samples)
36 poisson_var <- var(poisson_samples)
37 # Plot histogram
38 plot_histogram(data.frame(value = poisson_samples), "Poisson Distribution")
39 # Summary of distributions
40 distribution_summary <- data.frame(
41   Distribution = c("Bernoulli", "Binomial", "Poisson"),
42   Mean = c(bernoulli_mean, binomial_mean, poisson_mean),
43   Variance = c(bernoulli_var, binomial_var, poisson_var)
44 )
45 print(distribution_summary)
46

```

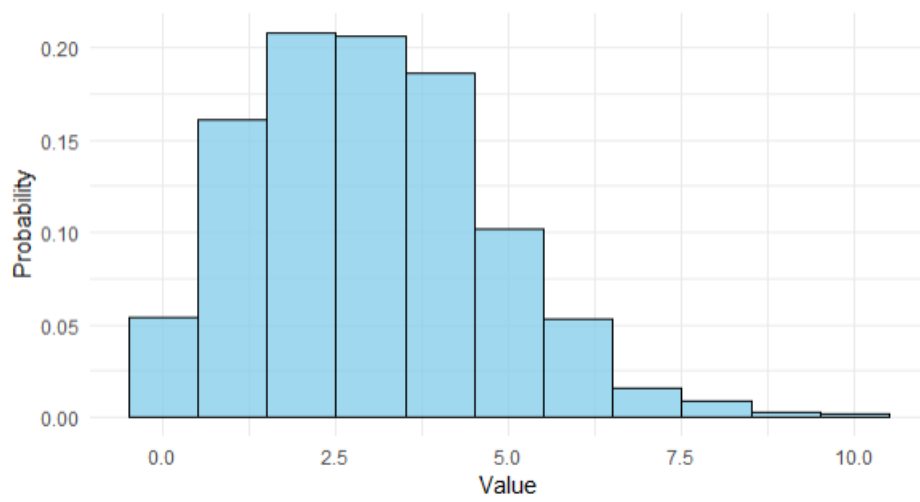
```

> print(distribution_summary)
  Distribution Mean Variance
1   Bernoulli 0.295 0.2081832
2   Binomial 2.984 2.0938378
3    Poisson 2.998 3.0990951

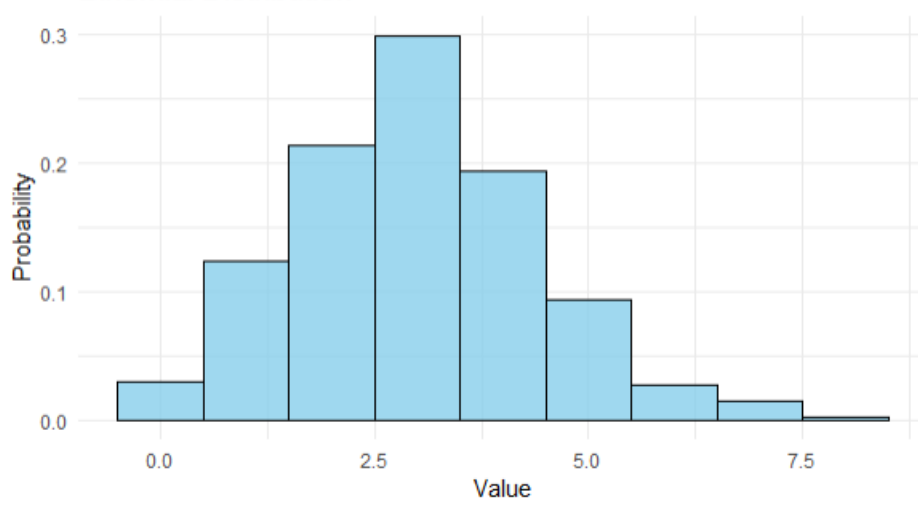
```

Data	
distribution_summary	3 obs. of 3 variables
\$ Distribution:	chr "Bernoulli" "Binomial" "Poisson"
\$ Mean	: num 0.295 2.984 2.998
\$ Variance	: num 0.208 2.094 3.099
Values	
bernoulli_mean	0.295
bernoulli_samples	int [1:1000] 0 1 0 1 1 0 0 1 0 0 ...
bernoulli_var	0.208183183183183
binomial_mean	2.984
binomial_samples	int [1:1000] 2 3 2 5 4 3 4 2 1 3 ...
binomial_var	2.09383783783784
lambda	3
n	10
p	0.3
poisson_mean	2.998
poisson_samples	int [1:1000] 1 1 1 3 3 3 3 1 0 2 ...
poisson_var	3.0990950950951
Functions	
plot_histogram	function (data, title)

Poisson Distribution



Binomial Distribution



Bernoulli Distribution

