Assignment – 6

**1. Binomial Distribution Setup**

n <- 10 # Number of trials

p <- 0.5 # Probability of success

x <- 0:n # Possible outcomes

# PMF Plot with Highlight for P(X = 3)

plot(x, dbinom(x, n, p), type="h", col="blue", lwd=2,

main="Binomial Distribution (n=10, p=0.5)",

xlab="Number of Successes", ylab="Probability")

# Highlight P(X = 3) on the graph

points(3, dbinom(3, n, p), col="red", pch=19, cex=1.5)

text(3, dbinom(3, n, p) + 0.02,

paste("P(X = 3) =", round(dbinom(3, n, p), 4)), col="red")

# Display Probability Values

cat("PMF (P(X = 3)):", dbinom(3, n, p), "\n")

cat("CDF (P(X ≤ 3)):", pbinom(3, n, p), "\n")

# Generate and Display Random Samples

random\_samples <- rbinom(5, n, p)

cat("Random Samples:", random\_samples, "\n")

**Output:**

source("D:/R\_Programs/Assignment6.R")

PMF (P(X = 3)): 0.1171875

CDF (P(X ≤ 3)): 0.171875

Random Samples: 7 8 3 5 7

|  |
| --- |
|  |
|  |
|  |

|  |
| --- |
|  |

**2. Poission Distribution**

lambda <- 4 # Mean number of occurrences

x <- 0:15 # Possible outcomes

y\_values <- dpois(x, lambda) # PMF values

# PMF Plot with Adjusted Y-axis Limit

plot(x, y\_values, type="h", col="blue", lwd=2,

main="Poisson Distribution (λ = 4)",

xlab="Number of Events", ylab="Probability",

ylim=c(0, max(y\_values) + 0.05)) # Extend y-axis limit

# Highlight P(X = 3) on the graph

points(3, dpois(3, lambda), col="red", pch=19, cex=1.5)

text(3, dpois(3, lambda) + 0.03, # Adjusted text position

paste("P(X = 3) =", round(dpois(3, lambda), 4)), col="red")

# Display Probability Values

cat("PMF (P(X = 3)):", dpois(3, lambda), "\n")

cat("CDF (P(X ≤ 3)):", ppois(3, lambda), "\n")

# Generate and Display Random Samples

random\_samples <- rpois(5, lambda)

cat("Random Samples:", random\_samples, "\n")

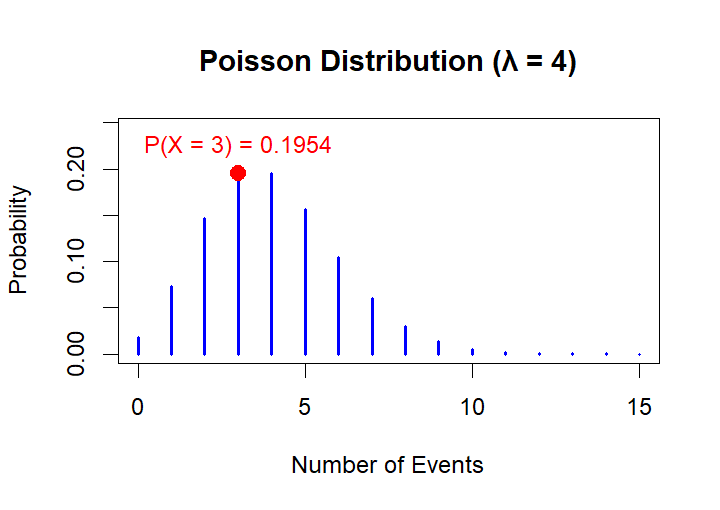
**Output:**

source("D:/R\_Programs/Assignment6.R")

PMF (P(X = 3)): 0.1953668

CDF (P(X ≤ 3)): 0.4334701

Random Samples: 5 6 7 2 3



**3. Normal Distribution**

mean <- 0 # Mean (μ)

sd <- 1 # Standard Deviation (σ)

x <- seq(-4, 4, by = 0.01) # Range of x values

# PDF Plot with Highlight for P(X between -1 and 1)

plot(x, dnorm(x, mean, sd), type="l", col="blue", lwd=2,

main="Normal Distribution (μ = 0, σ = 1)",

xlab="X values", ylab="Density")

# Highlight area under the curve for P(-1 ≤ X ≤ 1)

x\_shade <- seq(-1, 1, by = 0.01)

y\_shade <- dnorm(x\_shade, mean, sd)

polygon(c(-1, x\_shade, 1), c(0, y\_shade, 0), col=rgb(1, 0, 0, 0.3), border=NA)

# Display Probability Values

cat("PDF (P(X = 0)):", dnorm(0, mean, sd), "\n")

cat("CDF (P(X ≤ 1)):", pnorm(1, mean, sd), "\n")

# Generate and Display Random Samples

random\_samples <- rnorm(5, mean, sd)

cat("Random Samples:", random\_samples, "\n")