HW\_2\_1.R

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n\_X <- 10  
n\_Y <- 15  
mu\_X <- 5  
sigma\_X <- sqrt(8)  
mu\_Y <- -2  
sigma\_Y <- sqrt(16)  
  
num\_simulations <- 10000  
  
V\_samples <- numeric(num\_simulations)  
  
for (i in 1:num\_simulations) {  
 X\_sample <- rnorm(n\_X, mean = mu\_X, sd = sigma\_X)  
 Y\_sample <- rnorm(n\_Y, mean = mu\_Y, sd = sigma\_Y)  
   
 V\_samples[i] <- mean(X\_sample) - mean(Y\_sample)  
}  
  
mean\_V <- mean(V\_samples)  
var\_V <- var(V\_samples)  
  
proportion\_between\_6\_and\_9 <- mean(V\_samples >= 6 & V\_samples <= 9)  
  
cat("Mean of V:", mean\_V, "\n")

## Mean of V: 7.004447

cat("Variance of V:", var\_V, "\n")

## Variance of V: 1.860055

cat("Proportion of V between 6 and 9:", proportion\_between\_6\_and\_9, "\n")

## Proportion of V between 6 and 9: 0.696

hist(V\_samples, probability = TRUE, breaks = 30,   
 main = "Histogram of Sampled Values of V with PDF",  
 xlab = "V")

