Problem 1

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#Chad Huntebrinker  
#Problem 1.17  
library(ggplot2)  
  
# Parameters for Beta distribution (prior)  
alpha <- 0.5  
beta <- 0.5  
  
# Calculate the Post alpha star and beta star that is used in the bayes estimator  
alpha\_star <- alpha + 0  
beta\_star <- beta + 25 - 0  
  
#1 Bayes Estimator (mean of the Beta posterior)  
bayes\_estimator <- alpha\_star / (alpha\_star + beta\_star)  
cat("Bayes Estimator:", bayes\_estimator, "\n")

## Bayes Estimator: 0.01923077

#2 95% credible interval  
posterior\_interval <- qbeta(c(0.025, 0.975), alpha\_star, beta\_star)  
cat("95% Credible Interval:", posterior\_interval, "\n")

## 95% Credible Interval: 1.944577e-05 0.09468276

#3 Posterior probability P(pi < 0.5)  
probability\_less\_than\_0\_5 <- pbeta(0.5, alpha\_star, beta\_star)  
cat("Posterior Probability P(pi < 0.5):", probability\_less\_than\_0\_5, "\n")

## Posterior Probability P(pi < 0.5): 1