# Problem 1

Answer to the problem goes here.

1. Problem 1 part 1 answer here.

Text

Description automatically generated

The parameter estimates of and is 0.3954 and 0.7701 respectively. The Bayesian is 0.72.

1. Problem 1 part 2 answer here.

The posterior probability under alternative is 0.9975, and is 0.0025.

The posterior probability under alternative is 0.003, and is 0.997.

1. Problem 1 part 3 answer here

The predicative response has mean value 1.932, with 95% credible interval as [1.112, 2.729].

# Problem 2

Answer to the problem goes here.

1. Problem 2 part 1 answer here.

The product of the likelihood and the prior is proportional to

Then

Which is the density of

Which is the density of Exp ()

# Problem 2 part 2 answer here:

Chart, histogram

Description automatically generated

By burnin first 1000 observations, we have posterior samples.

Posterior mean: 105.9539

Posterior variance: 8.222889

The 94% credible set is [100.5183, 111.296]

R code:

thetas = rep(0,50000)

lambdas = rep(0,50000)

lambda = 1

theta = 110

for (i in 1:50000){

mean\_theta = (105.5\*120)/(120+lambda\*90/10)+(lambda\*90\*110)/(10\*120+lambda\*90)

var\_theta = (120\*90)/(10\*120+lambda\*90)

lamba\_mean = (120+(theta-110)^2)/(2\*120)

newtheta = rnorm(1,mean=mean\_theta,sd=sqrt(var\_theta))

newlambda = rexp(1,rate = lamba\_mean)

thetas[i] = newtheta

lambdas[i] = newlambda

theta = newtheta

lambda = newlambda

}

mean(thetas[1000:50000])

var(thetas[1000:50000])

summary(thetas[1000:50000])

quantile(thetas[1000:50000],0.03)

quantile(thetas[1000:50000],0.97)

hist(thetas,breaks = 30)