# Problem 1

Answer to the problem goes here.

1. Problem 1 part 1 answer here.

As the mean rate of defection in plant A is 0.02.

I postulate beta prior for the defective rate for plant A to be

As the mean rate of defection in plant B is 0.1.

I postulate beta prior for the defective rate for plant A to be

1. Problem 1 part 2 answer here.

Denote

During inspection,

Denote number of defections during inspection follow

In plant A:

In plant B:

1. Problem 1 part 3 :

In plant A: [0.03346604, 0.08544675]

In plant B: [0.05483958, 0.11707831]

1. Problem1 part 4:

In plant A: [0.03175030, 0.08313973]

In plant B: [0.05307317, 0.11483440]

# Problem 2

Which is the density of

Similarly,

Using the similar integration approach as above, the marginal distribution of is

# Problem 3

Thus,

Which is the kernel of Normal

As , the conditional distribution follows Normal

Which is the kernel of inverse gamma (,)

By implementing the Gibbs sampling (generate 100,000 samples and use 1,000 samples as burn-in ), I have the results below.

Posterior density plot of theta:

Chart, histogram

Description automatically generated

Posterior mean: -0.05653624

95% equi-tailed credible interval of θ: [-0.6406627, 0.5286508]