Stat 136 (Bayesian Statistics)

Laboratory Exercise 2

The number of claims received by an insurance company during a week follows a Poisson(λ) distribution. The weekly number of claims observed over a ten week period are: 5, 8, 4, 6, 11, 6, 6, 5, 6, 4.

1. Suppose a prior uniform distribution is used for λ.
    a. Find the posterior distribution for λ.
    b. What are the posterior mean, median, and variance in this case?
2. Suppose the Jeffrey's prior is used for λ.
    a. Find the posterior distribution for λ.
    b. What are the posterior mean, median, and variance in this case?
3. Suppose your prior belief about λ is that it has mean 4 and standard deviation 4.
    a. Find a Gamma(α; β) prior that matches your prior belief.
    b. Find the posterior distribution of λ.
    c. Calculate a 95% Bayesian credible interval for λ.
    d. Test the hypothesis $H_0 : \lambda = 7$ versus $H_1 : \lambda \neq 7$.