These questions were covered in details during the discussion sections.

A survey was done of bicycles and other vehicular traffic in the neighbourhood of the campus of the University of California, Berkeley in the spring of 1993. The data below gives the counts of bicycles in one hour in each of 10 randomly picked city blocks in fairly busy streets without bike routes.

10, 14, 5, 14, 29, 15, 0, 30, 25, 27

The parameter of interest is the underlying mean traffic count due to bicycles in an hour in these streets without bike routes. We will perform statistical inference on the above data. The first set of questions will help you do the analysis under the frequentist model, and the second set will assist you with the Bayesian analysis.

Classical (Frequentist) Approach

1. Write the down the statistical model.
2. Find the maximum likelihood estimator for λ, the mean traffic in these 10 blocks.
3. It can be shown that $W_n = \frac{\sqrt{n}(\bar{X}_n - \lambda)}{\sqrt{\bar{X}_n}}$ has approximately a standard normal distribution. Use this results to find a 95% symmetric confidence interval for the mean traffic in these blocks.
4. In an effort to be environmentally conscious, bike routes will be constructed if the mean traffic is more than 10 per hours. Based on your analysis, would you suggest to build bike routes?

Bayesian Approach

1. Assume a gamma prior distribution for λ with parameter $\alpha = 2, \beta = 2$. What kind of prior are we using? What does this prior belief say about the bike traffic, this is, what is its mean and variance?
2. Find the posterior distribution of λ.
3. Assuming a squared error loss function, what is the Bayes estimator of the mean traffic?
4. Find a symmetric 95% credible interval for the mean traffic.
5. In an effort to be environmentally conscious, bike routes will be constructed if the mean traffic is more than 10 per hours. Based on your analysis, would you suggest to build bike routes?