https://classroom.github.com/a/khrewH_X

Use the dataset found at the following link:

https://vincentarelbundock.github.io/Rdatasets/csv/DAAG/droughts.csv

Read the data into `R` and store it in a dataframe named `df`. Assume the data under the variable named `length` are $X_1, \ldots, X_N \sim_{iid} \text{Gamma}(\alpha, \beta)$.

The probability density function for the gamma distribution is

$$f(x|\alpha, \beta) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{(-\beta x)}$$

for $\alpha, \beta > 0$, and $x > 0$.

1. Estimate the parameters α and β using the likelihood method and the data `x`. Let's call the estimates $\hat{\alpha}$ and $\hat{\beta}$.
2. Make a plot of the density function evaluated using $\hat{\alpha}$ and $\hat{\beta}$. Use the range of the data $X_1, \ldots, X_N$ to determine the bounds of the plot. Hint: you still need to evaluate your own values in the support of the Gamma distribution to make this plot; you can not simply use the random variables $X_1, \ldots, X_N$.
3. Provide $R = 999$ estimates of α and β, by sampling uniformly and with replacement from the original data $X_1, \ldots, X_N$. For each bootstrapped re-sample, estimate and store the new parameter estimates. Don't forget to pre-allocate for each parameter; try using a matrix.
4. Make one plot for each parameter based on the R estimates.
5. Provide a 90% interval estimate for each parameter, by calculating (q_{10}, q_{90}) from each parameter's R estimates.
6. Provide a 90% interval for the mean of this assumed Gamma distribution, by first intelligently combining the $R = 999$ estimates of α and β.
7. Interpret the mean in context of the data. The README file on these data is located at the following link: https://vincentarelbundock.github.io/Rdatasets/doc/DAAG/droughts.html.