1. For the fluid breakdown time data in Table 2.3, complete the following:

   (a) Using information other than the data in Table 2.3 (the internet, call Jiffy Lube, etc.) develop a prior distribution for the exponential likelihood function for the fluid breakdown times.

   (b) Using an exponential distribution (with the rate parameterization) as a model for the failure time distribution, compute $E[\lambda | y]$.

   (c) Compute a 99% credible interval for the failure rate of the fluid breakdown time distribution and interpret the interval in context of the problem.

   (d) Compute $E[MTTF | y]$.

   (e) Compute a 99% credible interval for $E[MTTF | y]$ and interpret the interval in context of the problem.

   (f) Lubricating fluids are intended to be viscous for 7,500 hours or longer. Anything shorter will cause damage to aircraft for which this fluid was developed. What is the probability that the $MTTF$ lubricant will function as required?

2. Now suppose that data are Type I censored at 10,000 hours. That is, every observation over 10 in the data set is right censored.

   (a) Using an exponential distribution (with the rate parameterization) as a model for the failure time distribution, write down the likelihood.

   (b) Does this change your prior distribution? Please justify your decision.

   (c) Derive the posterior distribution for the censored likelihood.
3. For the data you collected in HW#1, do the following:

(a) Develop a prior distribution for the exponential likelihood function for the response variable (failure times).

(b) Using an exponential distribution (with the rate parameterization) as a model for the failure time distribution, compute \( E[\lambda|y] \).

(c) Compute a 99% credible interval for the failure rate of the exponential failure time distribution and interpret the interval in context of the problem.

(d) Compute \( E[MTTF|y] \).

(e) Compute a 99% credible interval for \( E[MTTF|y] \) and interpret the interval in context of the problem.

4. Please do the following problems from Hamada, et al. (2008):

(a) 2.2

(b) 2.4

(c) 2.5

(d) 2.6