STAT 430 HW#5

# Load parameters  
n1 <- 24  
ybar1 <- 7.8730  
s1 <- 0.05353  
n2 <- 123  
ybar2 <- 7.9725  
s2 <- 0.01409

### Independent draws from posterior ...  
  
Nsim <- 100000  
  
sigma1.2s <- 1 / rgamma(Nsim, (n1-1)/2, (n1-1)\*s1^2/2)  
sigma2.2s <- 1 / rgamma(Nsim, (n2-1)/2, (n2-1)\*s2^2/2)

Posterior inference based on empirical distribution of draws ...

#(a) Estimate the posterior mean of sigma1^2/sigma2^2  
mean(sigma1.2s/sigma2.2s)

## [1] 15.79358

#(b) Estimate the Monte Carlo error of your estimated posterior mean  
sd(sigma1.2s/sigma2.2s) / sqrt(Nsim)

## [1] 0.01745162

#(c) Estimate the posterior standard deviation of sigma1^2/sigma2^2  
sd(sigma1.2s/sigma2.2s)

## [1] 5.518686

#(d) Form a 95% equal-tailed credible interval for sigma1^2/sigma2^2  
quantile(sigma1.2s/sigma2.2s, c(0.025, 0.975))

## 2.5% 97.5%   
## 8.155102 29.341966

#(e) Frequentist approach of 95% confidence interval  
c(qf(0.025, n1-1,n2-1) \* (s1^2/s2^2),qf(0.975, n2-1,n1-1) \* (s1^2/s2^2))

## [1] 7.074207 29.448774

**Answer**: Compare with the result of credible interval, the 95% confidence interval is about the same