Erick Castillo

Response to Gibbs Sampling Questions:

Estimated marginal densities for θ and ξ:
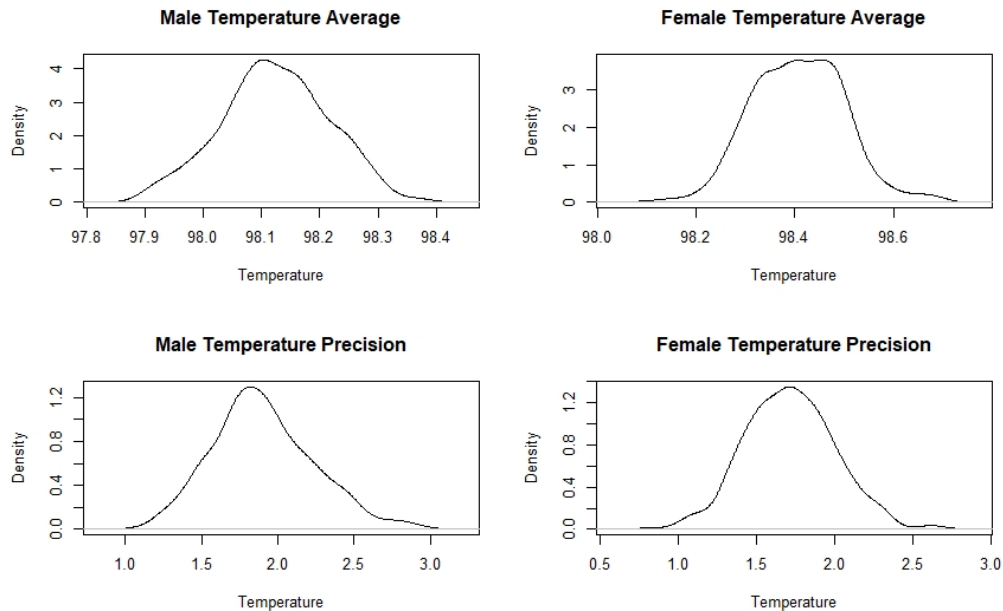
Responses to questions:

Question One:
The posterior distribution for each of θ for each sex is approximately normal. The density for male temperature average is centered about 98.1 degrees Fahrenheit while female temperature average is centered about 98.4 degrees Fahrenheit.

The spread of female temperature seems to be a lot wider as it has a lower precision than that of the males. This indicates that the standard belief that normal body temperature isn't really 98.6 degrees Fahrenheit as there seems to be variability from person to person.

Males tend to have lower body temperatures than females.

Question Two:
Male Posterior Mean: 98.12
Male Sample Mean: 98.10462

Female Posterior Mean: 98.41
Female Sample Mean: 98.39385
The sample means are the prior means. The sample mean is used initially to predict ksi, thus it is a prior.

Question Three:

Males Summary:

```
· summary(theta[501:1000])
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 97.89   98.06   98.12   98.12   98.19   98.38
```

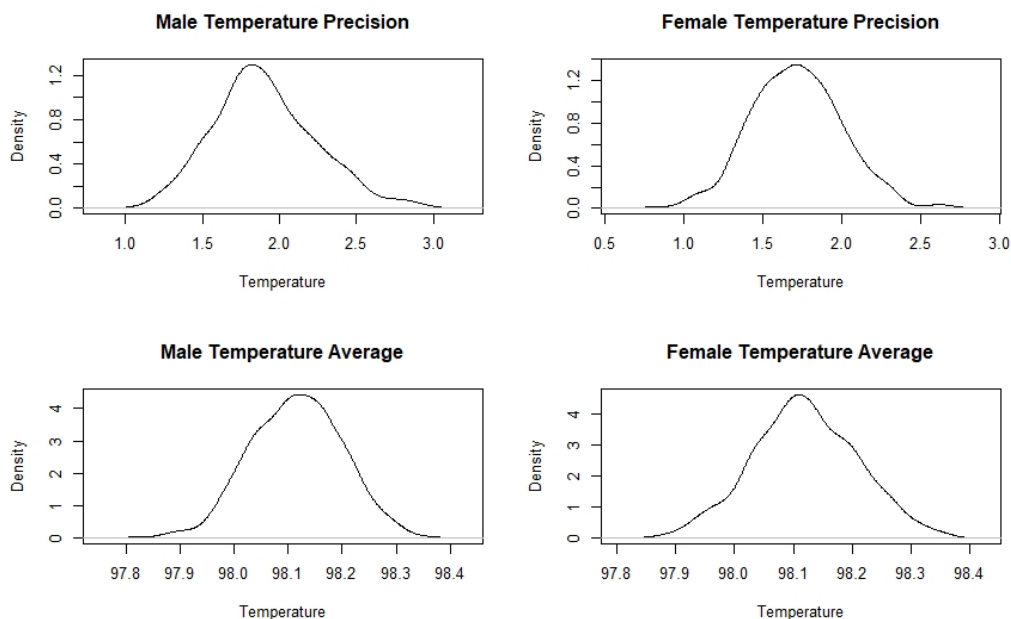Females Summary:

```
summary(theta[501:1000])
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 98.10   98.34   98.41   98.41   98.47   98.70
```

Their respective Q1 and Q3 are provided in the images above.

Question Four:

Posterior Mode of ξ for Males: 1.8
Posterior Mode of ξ for Females: 1.6

SD for males = $\dfrac{1}{\sqrt{1.8}} = 0.7453...$

SD for females = $\dfrac{1}{\sqrt{1.6}} = 0.79057...$

Extra Credit:

The above plots were created by first taking in a ksi value, then predicting theta, then predicting ksi, etc. This shows that the correct posterior conditional distribution of theta can be produced, even if we start from a different value.