3.

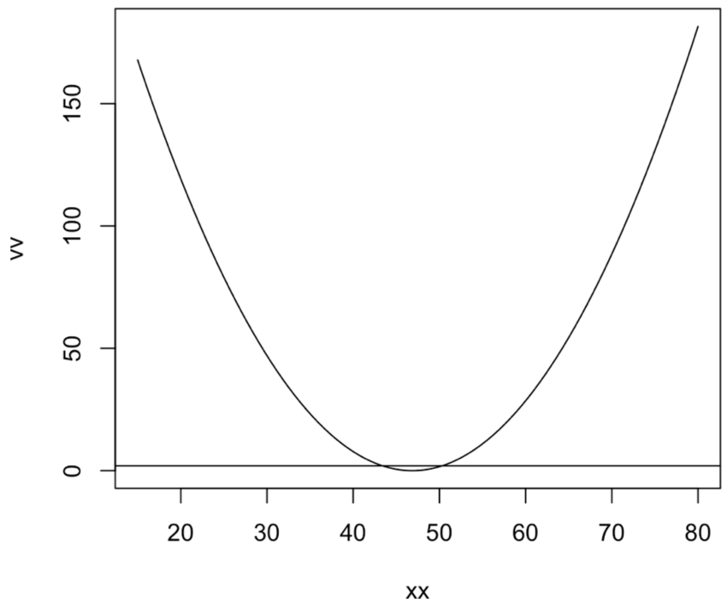
a) The formula for a 95% confidence interval for $\mu$ when $\sigma$ = 11 is known is $\bar{y} \pm a * \frac{\sigma}{\sqrt{n}}$ , where a is given by P($Z \leq a$) = $\frac{1+p}{2}$, where $Z \sim G(0,1)$, $\bar{y}$ is the sample mean, and n is the number of observed data. By evaluating the interval for the gasS data, we obtain 42.03903 and 51.68077.

b) The formula for a 95% confidence interval for $\mu$ when $\sigma$ is unknown is $\bar{y} \pm b * \frac{s}{\sqrt{n}}$ , where b is given by P($T \leq b$) = $\frac{1+p}{2}$ , where $T \sim t(n-1)$ , $\bar{y}$ is the sample mean, n is the number of observed data, and s is the sample standard deviation. By evaluating the interval for the gasS data, we obtain 41.77343 and 51.94637.

c) The formula for a 95% confidence interval for $\sigma^2$ when $\mu$ is unknown and estimated by $\bar{Y}$ is [$\frac{(n-1)s^2}{d}$, $\frac{(n-1)s^2}{c}$], where c and d are given by P(W $\leq c$) = $\frac{1-p}{2}$ = P (W > d) , where $W \sim \chi^2(n-1)$ , s is the sample standard deviation, and n is the number of observed data. By evaluating the interval for the gasS data, we obtain 68.31286 and 251.9769.

d) The formula for a 95% confidence interval for $\sigma$ when $\mu$ is unknown and estimated by $\bar{Y}$ is [$\sqrt{\frac{(n-1)s^2}{d}}$, $\sqrt{\frac{(n-1)s^2}{c}}$], where c and d are given by P(W $\leq c$) = $\frac{1-p}{2}$ = P (W > d) , where $W \sim \chi^2(n-1)$ , s is the sample standard deviation, and n is the number of observed data. Thus, we obtain 8.265159 and 15.87378.

e)




f)

Using the relative likelihood from Assignment 1 to construct a 95% confidence interval for $\mu$ when $\sigma$ = 11 is known, we get

$$\frac{1}{\sigma^2} \sum_{i=1}^{n} \left[ (y_i - \mu)^2 - (y_i - \hat{\mu})^2 \right] \leq m$$

, where m is given by P(W $\leq m$) = 0.95, where $W \sim \chi^2(1)$.

In this formula, $\sigma$ = 11 and n = 20 and $\hat{\mu} = 46.8599$.

The 95% confidence interval for $\mu$ is consisted of 42.03903 and 51.68076. This interval is approximately the same as the interval constructed in part a.