1. A sample of $N = 50$ people from a population with mean equal to 50 is given a treatment. After treatment, we find a sample mean of $\overline{X} = 51$ with $SS = 27,220$. Does the treatment result in larger scores compared to the general population?

   (a) explicitly define $\mathcal{H}_0$ and $\mathcal{H}_1$.

   (b) calculate and report the observed t-score

   (c) calculate and report the resulting Bayes factor

   (d) calculate and report the posterior probability of the "winning" model.

   (e) write a good conclusion

2. A sample of $N = 16$ individuals is selected from a population with mean 70 and given a treatment. After treatment, the sample mean is found to be $\overline{X} = 63.4$ with $SS = 960$. Does the treatment result in smaller scores compared to the general population?

   (a) explicitly define $\mathcal{H}_0$ and $\mathcal{H}_1$.

   (b) calculate and report the observed t-score

   (c) calculate and report the resulting Bayes factor

   (d) calculate and report the posterior probability of the "winning" model.

   (e) write a good conclusion

3. Two groups of $N = 18$ are enrolled in an experimental trial. The first group (who receives an experimental drug) had a mean score of $\overline{X}_1 = 86.4$ with $SS_1 = 1550$. The second group (a control group who received a placebo) had a mean score of $\overline{X}_2 = 78.8$ with $SS_2 = 1204$. Is there a difference in the population means of these two groups?

   (a) explicitly define $\mathcal{H}_0$ and $\mathcal{H}_1$.

   (b) calculate and report the observed t-score

   (c) calculate and report the resulting Bayes factor

   (d) calculate and report the posterior probability of the "winning" model.

   (e) write a good conclusion