Homework 9

Write a `.Rmd` file to answer these questions, knitting it to `.html` along the way. Start by pasting this outline to help the grader find your answers:

```
(Your Name Here)

## 1. Oximeters

## 1a.

## 1b.

## 2. Dairy

## 2a.

## 2b.
```

Knit your `HW11.Rmd` to `HW11.html` along the way. Turn in `HW11.html` to Canvas.

1. Each morning a hospital quality-control staff person checks two pulse oximeters by mounting them on a testing rig that simulates a stable patient. Experience shows that the oximeters give normally distributed readings with variances that match closely and change little, while the mean readings drift from one another over time. In one morning's check, simple random samples of 5 readings were taken from the first oximeter and of 7 readings from the second. The average oxygen level from the first oximeter was 98.3 with standard deviation 0.31, while the average from the second was 96.1 with standard deviation 0.29.

   (a) Find a 98% confidence interval for the true difference in mean readings from the two oximeters.

   (b) Run a test to decide whether the data are strong evidence the true mean readings from the two oximeters are different using level $\alpha = 0.02$.

2. A dairy scientist is testing a new feed additive. She chooses 13 cows at random from a large population. She randomly assigns $n_{old} = 8$ to the old diet and $n_{new} = 5$ to a new diet including the additive. The cows are housed in 13 widely separated pens. After two weeks, she milks each cow and records the milk produced in pounds:

   Old Diet: 43, 51, 44, 47, 38, 46, 40, 35
   New Diet: 47, 75, 85, 100, 58

   Let μ_{new} and μ_{old} be the population mean milk productions for the new and old diets, respectively. She wishes to test $H_0 : \mu_{new} - \mu_{old} = 0$ against $H_A : \mu_{new} - \mu_{old} \neq 0$ using $\alpha = 0.05$.

   (a) Graph the data as you see fit. Why did you choose the graph(s) that you did and what does it (do they) tell you?

   (b) Choose a test appropriate for the hypotheses and justify your choice based on your answer to part (a). Then perform the test by computing a p-value, and making a reject or not reject decision. Finally, state your conclusion in the context of the problem.