Statistical Methods for Data Science
Homework 7

Read Sections 9.4 and 9.5 of the textbook.

Solve the following exercises from the textbook:

9.7 (b), 9.9 (b), 9.10 (b), 9.13, 9.16 (b), 9.18 (b), 9.19

Additional exercises:

1. The effectiveness of a diet designed to lower serum cholesterol is to be evaluated by measuring the cholesterol of eight patients identified as being at risk of cardiovascular disease before and after being on the diet for 16 weeks. The data are as follows:

Patient	1	2	3	4	5	6	7	8
Before	213	252	195	222	267	216	209	255
After	199	241	197	220	248	224	209	237

   (a) Perform an appropriate test of hypothesis at 5% level to see whether the diet is effective. Assume normality for the cholesterol levels.
   (b) State your conclusion.

2. A study shows that 61 of 414 adults who grew up in a single parent household report that they suffered at least one incident of abuse during childhood. By contrast, 74 of 501 adults who grew up in two parent households report abuse. Is there significant difference in proportions of adults who report abuse between one and two parent households? Use 5% level of significance.

3. Researchers investigated how the size of a bowl affects how much ice cream people tend to scoop when serving themselves. At an "ice cream social," people were randomly given either a 17 oz or a 34 oz bowl (both large enough that they would not be filled to capacity). They were then invited to scoop as much ice cream as they liked. The portion size in each bowl was measured. The summary statistics of the data are as follows:

Small bowl	n=26, mean = 5.07 oz, sd = 1.84 oz

Large bowl	n=22, mean = 6.58 oz, sd = 2.91 oz

Did the bowl size change the selected portion size? Answer this question by performing an appropriate test of hypothesis. What assumptions did you make to perform the test?

4. The data below show the sugar content (as a percentage of weight) of several national brands of children's and adults' cereals.

   Children's cereals: 40.3, 55, 45.7, 43.3, 50.3, 45.9, 53.5, 43, 44.2, 44, 47.4, 44, 33.6, 55.1, 48.8, 50.4, 37.8, 60.3, 46.5

   Adults' cereals: 20, 30.2, 2.2, 7.5, 4.4, 22.2, 16.6, 14.5, 21.4, 3.3, 6.6, 7.8, 10.6, 16.2, 14.5, 4.1, 15.8, 4.1, 2.4, 3.5, 8.5, 10, 1, 4.4, 1.3, 8.1, 4.7, 18.4

   (a)Does it seem reasonable to make the equal variance assumption? Why or why not?
   (b)Perform an appropriate test of hypothesis at 5% level of significance. What assumptions did your make? Why do you conclude?