Biomedical Image Investigation: Fall 2024

Homework 10

Due: **12/9 PM 2:10**

For the exercises below, use the most appropriate test statistic you think to test the data. In addition, also use MATLAB function commands to verify your results. If the statistical significance is not consistent between your "handwriting" and MATLAB output, comment on possible reasons. Test the data **at the 0.05 significance level**.

1. Refer to the spreadsheet of HW9_excel, where group 1 have never smoked and group 2 are smokers. Assume that the underlying populations are normal and variances are equal.
   (a) Are the two samples of data paired or independent?
   (b) State the null and alternative hypotheses regarding the weights as well as the CBF rate.
   (c) Conduct the tests for both parameters. What do you conclude?

2. Thirty newborn babies were divided into three groups to test the efficacy of light treatment for newborn jaundice. Groups A and B was given blue light (phototherapy) and normal room light, respectively. Group C was positioned in a dark room with no light exposure. The bilirubin level was tested after 24 hours. Assume the samples are normally distributed.
   (a) What are the assumptions for this test?
   (b) Is there any difference for these three groups after treatment?

group	Bilirubin level (mg/dl)									
A	2.5	3.7	1.9	2.4	4.4	1.8	2.2	2.0	0.6	2.9
B	6.3	6.2	9.3	4.3	8.8	6.8	1.0	5.3	5.8	5.0
C	4.8	9.3	5.0	11.7	7.1	8.7	10.7	9.4	9.6	5.4

3. The following data are taken from a study that compares adolescents who have bulimia to healthy adolescents. The data consist of measures of daily caloric intake for random samples of 23 bulimic adolescents and 15 healthy ones.
   (a) What the null hypothesis is and conduct the test.
   (b) Do you believe that adolescents with bulimia require a lower daily caloric intake than do healthy adolescents?

Daily Caloric Intake (kcal/kg)				
Bulimic			Healthy	
15.9	18.9	25.1	20.7	30.6
16.0	19.6	25.2	22.4	33.2
16.5	21.5	25.6	23.1	33.7
17.0	21.6	28.0	23.8	36.6
17.6	22.9	28.7	24.5	37.1
18.1	23.6	29.2	25.3	37.4
18.4	24.1	30.9	25.7	40.8
18.9	24.5		30.6	