Assignment 2

Problem 1

The data contained in the **immunoglobulin.txt** file describes the concentrations of immunoglobulin G in the blood sera of 100 patients. Use R to execute each of the following tasks and clearly indicate the command in R that you use for the following tasks.

Task 1 Read the immunoglobulin.txt file in R and obtain a graphical description of the concentrations using both a histogram and a boxplot.

Task 2 Test the data for normality using the Anderson-Darling method.

Task 3 Interpret the combined results from Task 1 and Task 2.

Task 4 Apply a logarithmic transformation to the data and describe it graphically. Test the log transformed data for normality.

Task 5 Calculate a 95% Confidence Interval for the geometric mean of the original (not transformed) data.

Problem 2

A chemical theory suggests that the temperature at which a certain reaction occurs must be *higher* than 180 degrees Celsius. The results of 15 determinations were: 183.2, 179.4, 175.4, 179.0, 180.6, 178.1, 178.1, 175.7, 179.3, 176.9, 178.3, 179.1, 180.2, 174.2, 179.4.

Use R to test the claim that the mean temperature is greater than 180 and clearly indicate the command in R that you use.

What conclusions about the theory can be drawn from these data?

Problem 3

The following table gives the concentration of norepinephrine in the urine of healthy volunteers in their twenties for male and female. The male sample contains 15 values and the female sample has 20.

Male: 0.23, 0.32, 0.28, 0.37, 0.34, 0.25, 0.34, 0.22, 0.33, 0.26, 0.38, 0.21, 0.38, 0.27, 0.21.

Female: 0.25, 0.28, 0.32, 0.27, 0.29, 0.27, 0.31, 0.31, 0.30, 0.33, 0.33, 0.30, 0.29, 0.30, 0.29, 0.28, 0.31, 0.29, 0.33, 0.32.

Task 1 Test whether the concentrations have variances which differ significantly for the two genders.

Task 2 Test whether the mean concentrations differ significantly for the two genders.

Clearly indicate the hypothesis you are testing and the R commands that you use.

Problem 4

The Luteinizing hormone (LH) are measured for three groups of women: nonrunners, recreational runners and elite runners. The following measurements were made:

Nonrunners	Recreational runners	Elite runners
0.422	0.382	0.384
0.424	0.384	0.388
0.423	0.385	0.382
0.419	0.381	0.387
0.421	0.379	0.385

Test the null hypothesis that the mean LH is the same for all women regardless of the running group they belong to. Derive the test statistic and indicate all the steps involved in calculating it. Verify this result by performing an ANOVA test in R and indicate your conclusion.