6G7Z1020
Assignment 5

Refer to the work you have done in the lab practical, the relevant examples and the exercises given in the lecture notes. For each answer, include your results in a formatted PDF document that contains your graph, one small paragraph with your comments and a separate section that includes your `SAS` code.

Questions

1 Ebola virus fatality rate

In December 2013 the most widespread epidemic of Ebola virus in history begun in Guinea. It quickly spread in several countries of West Africa and it was officially ended at 9th of June 2016. According to a report of the World Health Organization[1] (WHO), as of the end of November 2014 there were 1,327 officially reported deaths out of the 2,164 diagnosed ebola virus cases in Guinea. In epidimiology the term *fatality rate* refers to the proportion of deaths in the reported cases. The same WHO report announced 3,145 deaths out of 7,635 cases for Liberia, and 1,583 deaths out of 7,312 for Sierra Leone. All three contries are neighboring countries in West Africa.

(a) Report a 95% confidence interval for the difference in fatality rates between Guinea and Liberia. [10]

(b) What does the confidence interval in (a) indicate about the rates in the two countries (Guinea and Liberia)? [10]

(c) Using the data from Guinea and Sierra Leone and the appropriate test check if the fatality rates where similar in these countries. Write an informative conlcusion. [20]

(d) **Optional - no marks** Does the assumption of Guinea being a representative sample of the whole West Africa area in valid? Justify your response in terms of the context of the problem.

2 Fertilizers

One wants to test two different brands of fertilizers. Table 1 provides the barley yield from twelve equal plots of land. Each plot was divided in two equal subplots and each subplot was randomly spread with a different fertilizer. We want to test if the difference in the mean yields between the

Plots	1	2	3	4	5	6	7	8	9	10	11	12
Fertilizer A	56	62	74	94	52	94	97	80	78	44	52	51
Fertilizer B	67	72	79	86	71	90	86	65	85	56	61	66

Table 1: Barley yields (kg).

two brands of fertilizers is statistically significant at the 5% significance level.

[1] `http://apps.who.int/gho/data/view.ebola-sitrep.ebola-summary-20141202?lang=en`

(a) Justify which test is appropriate to use. [10]

(b) Express the null and alternative hypothesis both in words and using mathematical notation. [5]

(c) Using the appropriate t-test, test if there are significant differences between the mean difference of the two fertilizers' yields. [10]

(d) Which fertilizer do you recommend? Justify your response. [5]

3 Ozone

In order to measure the effects of ozone scientists exposed a group of 22 rats (Treatment group) into an enviroment containing ozone for 7 days. Similary they kept a group (Control group) of 23 rats of similar age in a ozone-free enviroment. The file `ozr.csv` contains the weight gains/loses of each mouse (`Weight` variable) for both groups (`Group` variable). Analyze the data to determine the effect of ozone and write a summary of your conclusions. [30]