

PISc 724 – Homework #2

Questions are adapted from the text: Principals and Procedures of Statistics - A Biometrical Approach: 3rd Edition. 1997. R.G.D. Steel, J.H. Torrie, and D.A. Dickey.

1. From an area sown in with one cultivar of guayule, 54 plants were selected at random. Of these, 15 were off-types and 12 were aberrants. Rubber percentages for the plants were:

Off-types: 6.21, 5.70, 6.04, 4.47, 5.22, 4.45, 4.84, 5.88, 5.82, 6.09, 5.59, 6.06, 5.59, 6.74, 5.55

Aberrants: 4.28, 7.71, 6.48, 7.71, 7.37, 7.20, 7.06, 6.40, 8.93, 5.91, 5.51, 6.36

- a. Assuming the treatment variances are homogeneous, conduct a t -test at the 95% level of confidence to determine if the mean rubber percent of the off-type plants differs from the aberrant rubber plants.
 - b. Assuming the treatment variances are homogeneous and using a confidence interval at the 95% level of confidence, determine if the mean rubber percent of the off-type plants differs from the aberrant rubber plants.
 - c. Assuming the treatment variances are equal, conduct an F -test at the 95 and 99% levels of confidence to determine if the mean rubber percent of the off-type plants differs from the aberrant rubber plants.
2. In an experiment with oat, the mean yield was 52.8 bushels per acre and the experimental error variance was 20.31 with 36 df. A similar experiment under somewhat different circumstances might have $\bar{Y} = 48.4$ and $s^2 = 45.06$ with 24 df.

Assuming the error variances are not homogeneous, test the null hypothesis that the two population means are equal using a t -test at the 95% level of confidence.

3. The cooling constants of freshly killed mice and those of the same mice reheated to body temperature were determined to be:

Freshly killed: 573, 482, 377, 390, 535, 414, 438, 410, 418, 368, 445, 383, 391, 410, 433, 405, 340, 328, 400

Reheated: 481, 343, 383, 380, 454, 425, 393, 435, 422, 346, 443, 342, 378, 402, 400, 360, 373, 373, 412

Assuming the treatments are meaningfully paired, determine if there is no difference between the means at the 95% level of confidence using a t -test.

4. The effect of exposure of Lucerne flowers to different environmental conditions was studied. From 10 vigorous plants, the number of seeds set per two pods at the top vs. the bottom of the plant. The data were:

Plant	1	2	3	4	5	6	7	8	9	10
Top flower	4.0	5.2	5.7	4.2	4.8	3.9	4.1	3.0	4.6	6.8
Bottom flower	4.4	3.7	4.7	2.8	4.2	4.3	3.5	3.7	3.1	1.9

Assuming the treatments are meaningfully paired, compute a confidence interval at the 95% level of confidence to test the hypotheses:

$$H_0: \mu_{\text{top}} \leq \mu_{\text{bot}}$$

tom

$$H_A: \mu_{\text{top}} > \mu_{\text{bot}}$$

tom