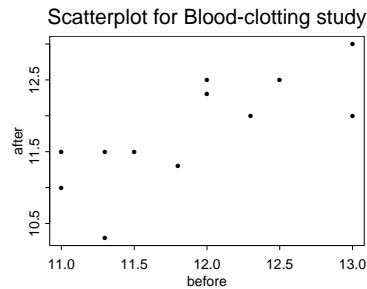


ST512-R
Homework #5

1. Rao 15.3
2. Rao 15.11 (in part (d), use Tukey instead of Scheffe)
3. A person's blood-clotting ability is typically expressed in terms of a "prothrombin time," which is defined to be the interval between the initiation of the prothrombin-thrombin (two proteins) reaction and the formation of the final clot. Does *aspirin* affect this function? Measurements made before administration of two tablets and three hours after.

| Subject | Prothrombin Times (seconds) | | Difference (D) |
|---------|-----------------------------|-------------------------|--------------------|
| | Before Aspirin (Y_1) | After Aspirin (Y_2) | |
| 1 | 12.3 | 12.0 | 0.3 |
| 2 | 12.0 | 12.3 | -0.3 |
| 3 | 12.0 | 12.5 | -0.5 |
| 4 | 13.0 | 12.0 | 1.0 |
| 5 | 13.0 | 13.0 | 0.0 |
| 6 | 12.5 | 12.5 | 0.0 |
| 7 | 11.3 | 10.3 | 1.0 |
| 8 | 11.8 | 11.3 | 0.5 |
| 9 | 11.5 | 11.5 | 0 |
| 10 | 11.0 | 11.5 | -0.5 |
| 11 | 11.0 | 11.0 | 0 |
| 12 | 11.3 | 11.5 | -0.2 |



- (a) Carry out a paired t -test of the hypothesis that prothrombin time is unaffected by aspirin.
 - (b) Carry out an F -test of the same hypothesis treating subjects as blocks in an analysis for a RCBD.
 - (c) Show that, in general, the paired t -test is equivalent to the F -test for the RCBD with block size equal to 2.
4. (taken from Ott and Longnecker 15.10, p. 889) Fuel efficiency of four blends of gasoline is measured in MPG. There is considerable variability due to driver. Another source of variability is model of car. An experiment randomizes four models of car and gasoline blends (A,B,C,D) to drivers according to the design below

| Driver | Model | | | |
|--------|---------|---------|---------|---------|
| | 1 | 2 | 3 | 4 |
| 1 | 15.5(A) | 33.8(B) | 13.7(C) | 29.2(D) |
| 2 | 16.3(B) | 26.4(C) | 19.1(D) | 22.5(A) |
| 3 | 10.5(C) | 31.5(D) | 17.5(A) | 30.1(B) |
| 4 | 14.0(D) | 34.5(A) | 19.7(B) | 21.6(C) |

- (a) Assuming normally distributed data, propose a model in which the effects of model, driver and blend are additive on the mean.
 - (b) Report estimates for these parameters.
 - (c) Using $\alpha = 0.05$, test the effects of each experimental factor.
5. [skip this one](#): Rao 15.11 (in part (d), use Tukey instead of Scheffe).
 6. Produce a randomized 5×5 latin square design for an experiment with five levels of an experimental factor of interest. Briefly describe how you went about designing the experiment.
 7. Rao 15.14
 8. Rao 14.1
 9. Rao 14.2
 10. Rao 14.5
 11. Rao 14.6