HW5

Choose any 10 questions to answer. I generally grade short answer questions on a 4 point scale, but for this HW only completely correct answers will be given 1 point. Partially correct (and partially incorrect) answers will be given 0 points.

1. How do observational studies and designed experiments differ?

2. What is pseudo-replication?

3. Explain the following phrase "Block what you can and randomize what you cannot"

4. What are nuisance variables and lurking variables?

5. What are OUs and EUs?

6. Give an example of a situation where OUs and EUs would differ.

7. What are the four principles of experimentation?

8. What is it important for EUs to be representative of the population?

9. What are the benefits of increased replication of treatments?

10. Why should treatments be randomly assigned to EUs?

11. What does local error control mean?

12. How does an analysis differ if a covariate is a categorical variable (factor in R) or a continuous variable. For instance, consider `lm(y ~ as.numeric(x))` vs. `lm(y ~ as.factor(x))`

13. What is power and how can it inform sample size decisions in a designed experiment?

14. How can specified precision (for say, a margin of error) be used to inform sample size decisions in a designed experiment?

15. What is a completely randomized design?

16. How do experimental and observational error differ.

17. What can influence experimental error?

18. What can influence observational error?

19. Compare and contrast controlling for a covariate using an ANCOVA model with blocking on a covariate.

20. When should a measured covariate (that wasn't controlled for with randomization) be included in a designed study? Why is this beneficial?

21. How do simple and main effects differ?

22. When considering many treatment factors, why is it a bad idea to conduct an experiment while fixing the level of one treatment factor?

23. How are inferences complicated if the treatment factors interact in a 2-factor experiment?

24. How does a blocking factor differ from a treatment factor?

25. What characteristics of our EUs would suggest that blocking is a good idea?

26. How can blocking reduce experimental error?

27. When would blocking not be useful?

28. What is a randomized complete block design?

29. What is a generalized randomized complete block design?

30. How can a generalized randomized complete block design be implemented with a factorial study?

31. What is an IBD?

32. When (why) would a researcher choose an IBD instead of a RCBD or GRCBD?

33. What is a latin square?

34. How can randomization account for multiple blocking factors?