Learning objectives for Exam I

Lecture

Chapter 1

1. How do we express expectation?
2. How do we express “AND” and “OR”?
3. What is statistical independence and dependence mean?
4. Define probability
5. Be able to estimate simple and conditional probabilities given frequencies

Chapter 2

6. Define hypothesis and theory
7. Define induction and deduction and what are their relationships to theories and hypotheses
8. What is the hypothetico-deductive method?
9. What are the contributions of Popper, Bacon, Chamberlin and Bayes
10. What is a prediction? What is the difference between a prediction and a hypothesis?
11. What are two ways of dealing with multiple hypotheses?
12. Define degrees of freedom, critical value, error rate, p-value
13. What is a null hypothesis, alternative hypothesis?
14. What is the Neyman-Person/frequentist approach?
15. What is the difference between non-directional and directional hypotheses? When do you use them?
16. How does one express statistical hypotheses in means and trends?
17. What is a two-tailed test, one tailed test? How does this affect p-values?
18. What is power? What influences power?
19. What are Type I and Type II errors?
20. What do you report in the frequentist paradigm
21. How do you interpret Bayes theorem?
22. What information does Bayes theorem give you?
23. When is the frequentist approach appropriate?
24. When is Bayes appropriate?
25. What types of inference do you get from the two schools?
26. What is parameter estimation?

Chapter 3

27. What is the difference between a parameter and a statistic and their representation?
28. What is the difference between a variable and a parameter and their representation?
29. How are positions in a matrix represented? How are test statistics represented?

Chapter 4

30. What is the difference between continuous and discrete data?
31. Define data on a ratio scale and interval scale
32. Define nominal data, ordinal or ranked data, and count data
33. Define random and systematic sampling? Why is random sampling important?
34. Define stratified random sampling, paired sampling and repeated sampling