

Midterm 1 Study Guide

Stat 2040

Ch 1 - 3

If you can do the following things, you should be able to get a solid A on the exam.

1. Define:
 - Population
 - Individual
 - Statistic vs. Parameter
 - Qualitative vs Quantitative variables
 - Discrete vs Continuous variables
2. Why do we take samples at all? Why not always study the whole population?
3. Define inferential statistics.
4. Know the difference between observational study and designed experiment
 - Can I infer causation from both of these? Why or why not?
5. Define and be able to identify confounding (lurking) variables
6. Given an example, be able to tell me what sampling method was used.
 - What are the advantages/disadvantages to each of these methods?
7. Given an example, be able to tell me what experimental design was used.
 - What are the advantages/disadvantages to each of these methods?
8. Be able to give examples of each of the sampling methods and experimental designs.
9. Be able to identify types of bias, including response and non-response bias, given an example.
10. Be able to tell the difference between sampling error and nonsampling error.
11. Define:
 - Factor

- Level (of a factor)
 - Treatment
 - Experimental unit
 - Subject
 - Control group
 - Placebo
 - Single blind experiments
 - Double blind experiments
 - Be able to design an experiment **using the six steps we covered in class.**
12. Given some data, be able to draw a bar graph.
 13. Given some data, be able to draw a histogram.
 - Can you do this if both variables are continuous? If one is discrete and the other continuous? If both are discrete?
 14. Be able to tell if a distribution is uniform, normal, or skewed (left or right).
 - Give examples of real-world situations which have uniform, normal, skewed-left and skewed-right distributions.
 15. Be able to detect when a graph misrepresents the data (section 2.4)
 16. Tell the difference between \bar{x} and μ .
 17. Tell the difference between σ and s .
 18. Given a (small) sample of data, be able to calculate the mean and median.
 19. Given a (small) sample of data, be able to calculate the standard deviation and IQR.
 - Calculate s vs σ .
 20. Given a (small) sample of data, be able to draw a boxplot, including using fences and correctly representing outliers.
 - Using the IQR, be able to determine whether or not a given value is an outlier.
 - **Remember!** The fences are given by $Q_1 - 1.5IQR$ and $Q_3 + 1.5IQR$, not median $\pm 1.5IQR$, like I stated the first time in class.
 21. Be able to give a five number summary.
 22. Be able to draw a boxplot which is normally distributed, skewed left and skewed right.
 23. Be able to calculate a weighted mean.

24. Calculate a z-score (both population and sample) and interpret its value (this could be done, for example, with the help of the Empirical Rule).
 - Be able to determine when a population z-score vs a sample z-score is needed.
25. Using a z-score, be able to determine whether or not a point is an outlier.
26. Given an example, be able to determine whether an outlier should or should not be removed from a dataset.
27. Define the Empirical Rule and be able to use it for a problem.