DALITE Q5 - Bootstrap, Tests of Significance, Binomial Distribution, Inference for Means and Proportions. Due October 8, 2019 by 10pm.

EPIB607 - Inferential Statistics[a]

[a]Fall 2019, McGill University

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This DALITE quiz will cover the bootstrap, an introduction to significance testing, and inference for a single mean using the t distribution. This will also cover the binomial distribution and inference for a sample proportion. You need to understand the binomial distribution before moving on to the chapter on one sample proportions. This is analgous to learning the normal distribution before inference for a single mean.

Hypothesis testing | Bootstrap | t distribution | One sample mean | Normal calculations | Confidence intervals | Central Limit Theorem (CLT) | Binomial distribution | One sample proportion

Marking

Completion of this DALITE exercise will be availble to us automatically through the DALITE website. Therefore **you do not need to hand anything in**. Marks will be based on the number of correct answers. For each question you will receive 0.5 marks for getting the correct answer on the first attempt and an additional 0.5 marks if you stick with the right answer or switch to the correct answer after seeing someone else's rationale. Recall that access to your assignments is managed through tokens sent to your e-mail address. You will be sent a new link everytime a new assignment has been posted.

1. Bootstrap

1.1. Learning Objectives.

1. Understand that the bootstrap can be used to simulate a sampling distribution
2. Confidence intervals can subsequently be calculated directly from the bootstrap distribution
3. Bootstrap confidence intervals do not rely on the Central Limit Theorem

1.2. Required Readings.

1. Computer-Intensive Methods in Statistics by Persi Diaconis and Bradley Efron, Scientific American 1983

2. Tests of Significance

2.1. Learning Objectives.

1. Understand that a significance test answers the question "Is this sample outcome good evidence that an effect is present in the population, or could it easily occur just by chance?"
2. Be able to formulate the null hypothesis and alternative hypothesis for tests about the mean of a population. Understand that the alternative hypothesis is the researcher's point of view.
3. Understand the concept of a p-value. Know that smaller p-values indicate stronger evidence against the null hypothesis.
4. Be able to calculate p-values as areas under a normal curve in the setting of tests about the mean of a normal population with known standard deviation.
5. Be able to test a population mean with a z-test.

2.2. Videos.

1. Against All Odds Unit 25

2.3. Required Readings.

1. Against All Odds Unit 25, pages 1-12
2. JH notes on p-values

3. Small Sample Inference for One Mean

3.1. Learning Objectives.

1. Understand when to use t-procedures for a single sample and how they differ from the z-procedures covered in Units 24 and 25.
2. Understand what a t-distribution is and how it differs from a normal distribution.
3. Know how to check whether the underlying assumptions for a t-test or t-confidence interval are reasonably satisfied.
4. Be able to calculate a t-confidence interval for a population mean.
5. Be able to test a population mean with a t-test. Be able to calculate the t-test statistic and to determine the p-value as an area under a t-density curve.
6. Be able to adapt one-sample t-procedures to analyze matched pairs data.

3.2. Videos.

1. Against All Odds Unit 26

3.3. Required Readings.

1. Against All Odds Unit 26, pages 1-11
2. DVB Chapter 23

4. Binomial Distributions

4.1. Learning Objectives.

1. Be able to identify a binomial setting and define a binomial random variable.
2. Know how to find probabilities associated with a binomial random variable.
3. Know how to determine the mean and standard deviation of a binomial random variable.

4.2. Videos.

1. Against All Odds Unit 21

4.3. Required Readings.

1. Against All Odds Unit 21, pages 1-10
2. JH notes Section 1 on binomial distributions
3. DVB Chapter 17 (Binomial Model)

5. Inference for Proportions

5.1. Learning Objectives.

1. Identify inference problems that concern a population proportion.
2. Know how to conduct a significance test of a population proportion.
3. Be able to calculate a confidence interval for a population proportion.
4. Understand that the z-inference procedures for proportions are based on approximations to the normal distribution and that accuracy depends on having moderately large sample sizes.

5.2. Videos.

1. Against All Odds Unit 28

5.3. Required Readings.

1. Against All Odds Unit 28, pages 1-11
2. JH notes Section 2 on Inference for a proportion
3. DVB Chapters 19, 20 and 21