

# DALITE Q5 - Bootstrap, Tests of Significance and Small Sample Inference for One Mean. Due October 3, 2018 by 5pm.

## EPIB607 - Inferential Statistics<sup>a</sup>

<sup>a</sup> Fall 2018, 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.**

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

### Marking

Completion of this DALITE exercise will be available 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. **B&M chapter 14**, pages 345-359

## 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. **B&M Chapter 17**, pages 411-422