MIS770 Foundation Skills in Business Analysis

DEPARTMENT OF INFORMATION SYSTEMS AND BUSINESS ANALYTICS
DEAKIN BUSINESS SCHOOL
FACULTY OF BUSINESS AND LAW

Revision Tutorial Topic 7

Hypothesis Tests

Introduction

In this topic we will be looking at the purpose of a Hypothesis Test and how to create and interpret them.

Hypothesis testing follows on from Confidence Intervals and together they are probably the two most useful tools used by statisticians. They are both widely used in decision making and research and in some instances, I can use either or both, it just depends on the situation that I'm actually investigating.

I use a confidence interval when I have absolutely no idea about the value of the population parameter that I'm investigating. But I'm going to use a hypothesis test when I do have some idea about the value of the population parameter. In other words, if I have some type of prior knowledge or prior experience, or if I'm testing a standard or a claim, then I would use a Hypothesis test.

Therefore, the aims of this tutorial are to:

- identify the basic principles of hypothesis testing
- explain the assumptions of each hypothesis-testing procedure, how to evaluate them and the consequences if they are seriously violated
- use hypothesis testing to test a mean or proportion
- recognise the pitfalls involved in hypothesis testing
- identify the ethical issues involved in hypothesis testing

Textbook Questions

9.16 As a result of complaints from both students and teaching staff about the timetable, the registrar at a large university wants to adjust the scheduled class times to allow for adequate travel time between classes and is ready to undertake a study. Until now, the registrar has believed that 10 minutes between scheduled classes is sufficient. State the null hypothesis, H_0, and the alternative hypothesis, H_1.

9.44 You are the manager of a restaurant that delivers pizza to customers. You have just changed your delivery process in an effort to reduce the mean time between the order and completion of delivery from the current 25 minutes. From past experience, you can assume that the population standard deviation is 6 minutes. A sample of 36 orders using the new delivery process yields a sample mean of 22.4 minutes.

a. Using the six-step critical value approach, at the 0.05 level of significance, is there sufficient evidence that the mean delivery time has been reduced below the previous value of 25 minutes?

b. At the 0.05 level of significance, use the five-step p-value approach.

c. Interpret the meaning of the p-value in (b).

d. Compare your conclusions in (a) and (b).

9.68 The Australian Bureau of Statistics reported that, for the year 2015–16, 38.2% of businesses had a social media presence (Australian Bureau of Statistics, Business Use of Information Technology, 2015–16, Cat. No. 8129.0). Assume a recent survey has been carried out of 3,996 Australian businesses. Results show that 1,595 of them have a social media presence.

a. At the 0.05 level of significance, use the six-step hypothesis-testing method to try to prove that the percentage of businesses with a social media presence has increased from 38.2%.

b. Use the five-step p-value approach. Interpret the meaning of the p-value.

9.70 A coin-operated soft-drink machine is designed to discharge at least 200 mL of drink per cup with a standard deviation of 6 mL. If you select a random sample of 16 cups and you are willing to have an $\alpha = 0.05$ risk of committing a Type I error, calculate the power of the test and the probability of a Type II error (β) if the population mean amount dispensed is actually:

a. 197 mL per cup

b. 194 mL per cup

TEXTBOOK REFERENCE:

Basic Business Statistics: Concepts and Applications. *Berenson, M.L. Levine, D.M. Szabat, K.A. O'Brien, M. Jayne, N. Watson, J.* 5th edition. 2019. Pearson Australia Group Pty Ltd. ISBN 9781488617249. Chapter 9, sections 9 to 9.5 and 9.7.