Tutorial Business Analytics

Homework 2

Exercise 2.4

32 randomly selected men and women participated in a clinical trial. The purpose of the study was to compare vegetarian diets to non-vegetarian diets. The hypothesis to be tested is: "On average, vegetarians eat fewer calories than non-vegetarians". The sample mean for the 12 vegetarians is $x_1 = 1780$ calories per day, while the sample mean for non-vegetarians amounts to $x_2 = 1900$ calories per day. Moreover, the sample standard deviations are: $s_1 = 230$ and $s_2 = 250$.

- a) Calculate a 95% confidence interval for the average daily intake of each group.
- b) How do you assess above hypothesis considering the confidence intervals from question a)?
- c) Which test is suitable for testing above hypothesis? Briefly explain your choice and perform the test with significance level α = 0.05 and 25 degrees of freedom.

Exercise 2.5

a) Assess whether the following sample could possibly have been taken from a population with mean equal to 0. ($\alpha = 0.05$)

23242452143032453301

Solve this question manually (pen & paper) and then a second time using R (use the function "t.test()")

Printly applies the tages a Value

b) Briefly explain the term p-Value.

u=20 u=0 $\frac{2.65}{1.46} \sqrt{20} = 8.12$

 $p_{X} = \frac{53}{20} = 2.65 \quad \text{So}_{X} = 1.46$ 11.045 = 2.13 $3_{X} = \frac{1}{19} \frac{1$

Confidence Intervals

Find confidence intervals for μ_x , which—under H_0 —contain the true value μ_x with a probability of at least $1-\alpha$ (confidence level). We differentiate two cases:

• σ_x known:

confidence interval:

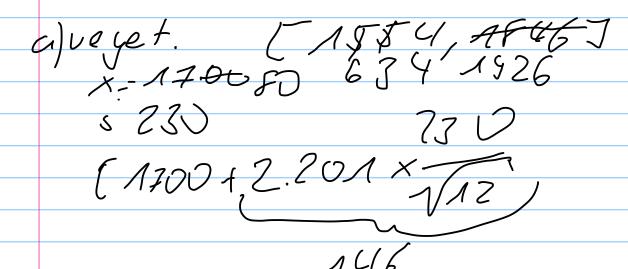
$$[I_u(x), I_o(x)] = \left[\bar{x} - z_{1-\frac{\alpha}{2}}^c \frac{\sigma_x}{\sqrt{n}}, \ \bar{x} + z_{1-\alpha/2}^c \frac{\sigma_x}{\sqrt{n}}\right]$$

• σ_x unknown, use s_x as estimate instead:

confidence interval:

$$[I_u(x), I_o(x)] = \left[\bar{x} - t_{1-\frac{\alpha}{2}; n-1}^c \frac{s_x}{\sqrt{n}}, \ \bar{x} + t_{1-\frac{\alpha}{2}; n-1}^c \frac{s_x}{\sqrt{n}}\right]$$

Values of μ₀ within the confidence interval cannot be rejected regarding a significance level of α
 → Reject H₀ if μ₀ is not in the confidence interval



1500 250

> +0.75,1y = 2.093 [175,2017]

2c) two samples, independent th: Mx 2 po, Ho Mx 2 po

$$5^{2}_{3-\omega} = \frac{250^{2}}{17} + \frac{250^{2}}{20} - 7555$$