EC1011: Data Analysis II – Multiple Choice Questions

Topic 4: Hypothesis Testing

Questions 1-3 are based on the information given below:

Suppose that you want to test the claim made by an accountant that he is able to complete a standard tax return in under an hour. For a random sample of 24 tax returns, the accountant averages 63.2 minutes with a standard deviation of 7.7 minutes. (Assume a normal distribution)

1. What is the test statistic for this test?

   A. $Z = 2.04$
   B. $t = 1.79$
   C. $t = 2.04$
   D. $Z = 1.79$

2. What are the appropriate null and alternative hypotheses?

   A. $H_0: \mu = 60$ and $H_1: \mu \neq 60$
   B. $H_0: \mu = 0$ and $H_1: \mu > 0$
   C. $H_0: \mu = 60$ and $H_1: \mu < 60$
   D. $H_0: \mu > 60$ and $H_1: \mu \leq 60$

3. What is the most accurate estimate of the *p*-value?

   A. *p*-value < 0.05
   B. *p*-value < 0.025
   C. *p*-value < 0.10
   D. *p*-value < 0.01

4. The maximum probability of committing a Type I error is

   A. also the level of significance
   B. never more than 0.05
   C. the power of the test
   D. zero if the null hypothesis is rejected

5. Which of the following is a correct statement (in the context of hypothesis tests)?

   A. The Power of a test increases as the Type 2 error probability does
   B. It is not possible to decrease both Type 1 error and Type 2 error at the same time.
   C. The significance level is always equal to the probability of Type 2 error.
   D. A test is significant if it fails to reject the null hypothesis.

6. In a hypothesis test, the researcher rejects the null hypothesis at 5% level of significance. Which of the following conclusions necessarily follows?

   A. The null hypothesis would have been rejected at 1% level of significance.
   B. The p-value of the test was less than 3%
   C. The p-value of the test was less than 10%
   D. The researcher performed a two-tailed test with 10% significance level.

Of a random sample of 75 health insurance firms, 50 have reported an increase in profit last year. Of a second random sample of 75 car insurance firms 44 have reported an increase in profit in the same period. You want to test the hypothesis that proportion of health insurance firms (PH) reporting an increase in profit is not different from that of the other (PC).

Questions 7-12 are based on the above information:

7. The alternative hypothesis ($H1$) for the test to be performed is

   A. $H1: PH - PC \neq 0$
   B. $H1: PH - PC > 0$
   C. $H1: PH - PC < 0$
   D. $H1: PH > PC$

8. What is the relevant critical value(s) at the 10% level of significance?

   A. $Zc = \pm 1.96$
   B. $Zc = \pm 1.65$
   C. $Zc = +1.28$
   D. $Zc = -1.28$

9. An unbiased estimate of PH is the number

   A. 50
   B. 0.255
   C. 0.667
   D. 1.5

10. An estimate of the common proportion is given by

A. 0.750
B. 0.627
C. 0.440
D. 0.556

11. Which of the following is the correct value of the z-statistic?

A. 1.82
B. 1.52
C. 1.02
D. 1.01

12. What conclusion should you draw at 10% significance level?

A. Fail to reject the null hypothesis and conclude that there is a significant difference in the two proportions
B. Reject the null hypothesis and conclude that there is a significant difference in the two proportions
C. Fail to reject the null hypothesis and conclude that there is no evidence of significant difference in the two proportions
D. Reject the null hypothesis and conclude that there is a PH is significantly greater than PC

13. In a two-tailed hypothesis about a population mean with a sample size of 100 and $\alpha = 0.10$, the rejection region would be

A. Z > 1.64
B. Z > 1.28
C. Z<-1.28 and Z>1.28
D. Z<-1.64 and Z>1.64

14. In calculating the t-statistic to perform a hypothesis test on the value of the population mean when the population variance σ^2 is not known, the statistician should use

A. a consistent estimator of σ
B. an efficient estimator of σ
C. an unbiased estimator of σ
D. a BLUE estimator of σ

15. Match the symbol α with the correct definition.

A. The power of a test.
B. The probability of a Type I error.
C. The probability of a Type II error.
D. The probability of failing to reject the null hypothesis when it is true.

16. Match the symbol $(1-\alpha)$ with the correct definition.

A. The power of a test.
B. The probability of a Type I error.
C. The probability of a Type II error.
D. The probability of failing to reject the null hypothesis when it is true

17. A professor of statistics wants to test that the average amount of money a typical college student spends per day during spring break is over $70. Based upon previous research, it is found that the population distribution is normal with a standard deviation of $17.32. The professor surveys 35 students and finds that the mean spending is $72.43. Which of the following statements is most accurate?

A. Unable to reject the null hypothesis at $\alpha \leq 0.10$
B. Reject the null hypothesis at $\alpha = 0.10$
C. Reject the null hypothesis at $\alpha = 0.05$
D. Reject the null hypothesis at $\alpha = 0.01$

Answers:

1. C
2. C
3. A
4. A
5. B
6. C
7. A
8. B
9. C
10. B
11. D
12. C
13. D
14. C
15. B
16. D
17. A