Testing – 6.1 Specification testing

Michel Bierlaire

Solution to practice quiz

1. If the hypothesis test does not reject the null hypothesis, we can conclude that the null hypothesis is true.

   (a) True

   (b) False

   Correct answer: False. Hypothesis testing is never fully conclusive. There is always a possibility to make the wrong decision. When the null hypothesis is not rejected, it is because there is not enough evidence to reject it. It does not mean that it is true. Similarly, a trial may fail to convict a guilty criminal.

2. When we reject a true null hypothesis, we commit a Type I error.

   (a) True

   (b) False

   Correct answer: True. A Type I error occurs when the null hypothesis is rejected when it is true.

3. When the null hypothesis is false and is not rejected, you make a type II error.

   (a) True

   (b) False

   Correct answer: True. A Type II error occurs if we fail to reject the null hypothesis when it is false.

4. The power of a test is the probability of rejecting the null hypothesis when it is true.

   (a) True

   (b) False

   Correct answer: False. The probability of rejecting the null hypothesis when it is true is the Type I error. The power of a test is the probability of rejecting the null hypothesis when it is false.

5. If the level of significance of a test is increased, the power of the test decreases.

   (a) True

   (b) False

   Correct answer: False. As the level of significance α increases, the test rejects the null hypothesis more often. Therefore, if the null hypothesis happens to be false, the risk β to make a mistake decreases. Consequently, the power $(1 - \beta)$ increases.

6. If a null hypothesis is rejected at the level of significance 0.01, it is also rejected at the level of significance 0.05.

   (a) True

   (b) False

   Correct answer: True. The larger the level of significance, the most likely it is to reject the null hypothesis.

7. For a given level of significance, if the sample size is increased, the power of the test decreases.

   (a) True

   (b) False

   Correct answer: False. As we have more information with a larger sample, we can only do better. The power of the test increases.