

9.1: Hypothesis Testing Problem Solving Steps

Now that we have some background on setting up hypotheses and finding critical regions, we introduce the steps needed for every hypothesis testing procedure. Hypothesis testing is based directly on sampling theory and the probabilities $P(\text{test statistic} \mid H_0)$ that the sampling theory gives. Here are the steps we will follow :

1. **Hypotheses** : Formulate H_0 and H_1 . State which is the claim
2. **Critical statistic** : Find the critical values and regions. (Use tables of z , t , χ^2 , etc. values).
3. **Test statistic** : Compute the test statistic from your data. It summarizes your data in one number. The p -value follows from the test statistic.
4. **Decision** : If the test statistic falls in the critical region (rejection region), reject H_0 . (This decision can also be made using the p -value.)
5. **Interpretation** : Summarize results in a sentence and/or present a graphic or table.

The definition of a p -value will be covered below. For now you should know that a computer program (SPSS) will give you a p -value but not a critical statistic. So there is no Step 2 if you use SPSS.

A generic test statistic may be defined by :

$$\text{test value} = \frac{(\text{observed value}) - (\text{expected } H_0 \text{ value})}{\text{standard error}}. \quad (9.1.1)$$

The numerator represents a signal or an effect. The denominator represents noise. Not all test statistics will have this form (e.g. some χ^2 test statistics), but all test statistics represent a signal-to-noise ratio. Much of the tabular output of SPSS gives the numerator and denominator of this generic form with or without the corresponding test statistic.

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