

### Exercise V – Estimation

1. Student in a large lecture section asked students how much they paid for a used copy of the text. The  $n = 38$  responses yielded

$$\sum x_i = 3230.84 \quad \sum (x_i - \bar{x})^2 = 2028.35$$

- a) Give a point estimate of  $m$ , the mean price paid.
  - b) Determine the estimated standard error.
  - c) Calculate the 95% error margin.
2. A zoologist wishes to estimate the mean blood sugar level of a species of animal when injected with a specified dosage of adrenaline. A sample of 55 animals of a common breed are injected with adrenaline, and their blood sugar measurements are recorded in units of milligrams per 100 milliliters of blood. The mean and standard deviation of these measurements are found to be 126.9 and 10.5, respectively.
- a) Give a point estimate of the population mean and find a 95.4% error margin.
  - b) Determine a 90% confidence interval for the population mean.
3. In each case, identify the null hypothesis ( $H_0$ ) and the alternative hypothesis ( $H_1$ ) using the appropriate symbol for the parameter of interest.
- a) A consumer group plans to test-drive several cars of a new model in order to document that its average highway mileage is less than 50 miles per gallon.
  - b) Confirm the claim that the mean number of pages per transmission sent by a campus fax station is more than 3.4.
  - c) A chiropractic method will be tried on a number of persons suffering from persistent backache in order to demonstrate the claim that its success rate is higher than 50%.
  - d) The setting of an automatic dispenser needs adjustment when the mean fill differs from the intended amount of 16 ounces. Several fills will be accurately measured in order to decide if there is a need for resetting.
  - e) The content of fat in a gourmet chocolate ice cream is more than the amount, 4%, that is printed on the label.

4. A literary critic wants to establish that the mean number of words per sentence, appearing in a newly discovered short story, is different from 9.1 words. A sample of 36 sentences provided the data

$$\bar{x} = 8.6 \quad \text{and} \quad s = 1.2$$

- a) Formulate the null and alternative hypotheses. (Define any symbols you use.)
- b) Determine the test statistic.
- c) Give the form of the rejection region.
- d) What is the conclusion to your test? Take  $\alpha = 0.10$ .
- e) Calculate a  $P$ -value.
- f) Based on Part (d), what error could you have possibly made?