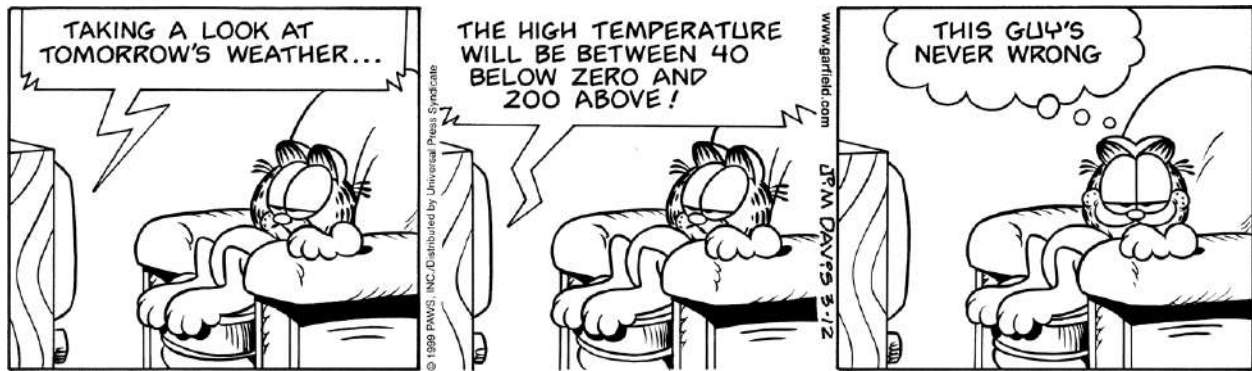


## Chapter 8: Estimating with Confidence

### Key Vocabulary:

- point estimator
- point estimate
- confidence interval
- margin of error
- interval
- confidence level
- random
- normal
- independent
- four step process
- level C confidence interval
- degrees of freedom
- standard error
- one -sample z interval
- t distribution
- t-procedures
- one-sample t interval
- robust



### 8.1 Confidence Intervals: The Basics (pp.615-643)

1. A *point estimator* is a statistic that...
2. The value of the point estimator statistic is called a \_\_\_\_\_ and it is our "best guess" at the value of the \_\_\_\_\_.
3. Summarize the facts about *sampling distributions* learned in chapter 7:

Shape

Center

Spread

4. In statistics, what is meant by a *95% confidence interval*?
5. A confidence interval takes the form of : “**estimate**  $\pm$  **margin of error**”  
where:     estimate =  
              margin of error =
6. Define a *level C confidence interval*.
7. What information does the margin of error provide?
8. Sketch and label a *95% confidence interval* for the standard normal curve.
9. In a sampling distribution of  $\bar{x}$  , why is the interval of numbers between  $\bar{x} \pm 2s$  called a *95% confidence interval*?
10. Sketch and label a *90% confidence interval* for the standard normal curve.
11. *Interpret a Confidence level*: "To say that we are 95% confident is shorthand for .....
12. Explain how to interpret a *Confidence interval*.
13. Does the confidence level tell us the chance that a particular confidence interval captures the population parameter? If not, what does it tell us?

14. What does the *critical value* depend on?
15. Write the *form* for calculating a confidence interval as shown on page 478.
16. Why do we want high confidence and a small margin of error?
17. Explain the two conditions when the margin of error gets smaller.
18. State the three **conditions for constructing a confidence interval** for  $p$  or  $\mu$ .
  - Random
  - Normal
  - Independent
19. What are the two important reminders for constructing and interpreting confidence intervals?

## **8.2 Estimating a Population Proportion (pp.484-494)**

1. In statistics, what is meant by a *sample proportion*:  $p$  ?
2. Give the mean and standard deviation for the sampling distribution of  $p$  ?
3. How does the standard deviation differ to to standard error for the sampling distribution of  $p$  ?
4. Describe the sampling distribution of a sample proportion  $p$  as learned in section 7.2.
  - Shape
  - Center
  - Spread
5. Define *standard error*.
6. In general what is meant by the standard error of a statistic?
7. How do you calculate the standard error of  $p$  ?
8. What is the formula for a *one-sample z interval for a population proportion*? Describe how to construct a level C confidence interval for a population proportion.

9. Describe the four step process on how to construct and interpret a confidence interval.

- State
- Plan
- Do
- Conclude

10. What formula is used to determine the sample size necessary for a given margin of error?

11. What conditions must be met in order to use *z procedures* for inference about a proportion?

12. What does  $z^*$  represent?

13. What is the value of  $z^*$  for a *95% confidence interval*? Include a sketch.

14. What is the value of  $z^*$  for a *90% confidence interval*? Include a sketch.

15. What is the value of  $z^*$  for a *99% confidence interval*? Include a sketch.

### 8.3 Estimating a Population Mean (pp.499-515)

1. What is the formula for a *one-sample z interval for a population mean*? Describe how to construct a level C confidence interval for a population mean.
2. What is the formula for the margin of error of the confidence interval for the population mean  $\mu$ ?
3. How can you arrange to have both high confidence and a small margin of error?
4. Describe the three steps for choosing a sample size for a desired margin of error when estimating  $\mu$ .
5. What happens to the *margin of error* as  $z^*$  gets smaller? Does this result in a higher or lower confidence level?
6. What happens to the *margin of error*, as  $\sigma$  gets smaller?
7. What happens to the *margin of error*, as  $n$  gets larger? By how many times must the sample size  $n$  increase in order to cut the *margin of error* in half?
8. The formula used to determine the sample size  $n$  that will yield a confidence interval for a population mean with a specified margin of error  $m$  is  $z^* \frac{\sigma}{\sqrt{n}} \leq ME$ . Solve for  $n$ .
9. It is the size of the \_\_\_\_\_ that determines the margin of error. The size of the \_\_\_\_\_ does not influence the sample size we need.

10. Complete the Check Your Understanding on page 501.
11. How do you calculate the *degrees of freedom* for a *t distribution*?
12. What happens to the *t distribution* as the *degrees of freedom* increase?
13. How would you construct a *t distribution*?
14. Describe the differences between a *standard normal distribution* and a *t distribution*.
15. Describe the similarities between a *standard normal distribution* and a *t distribution*.
16. What is the formula for the *standard deviation* of the sampling distribution of the sample mean  $\bar{x}$ ?
17. What is the *standard error* of the sample mean  $\bar{x}$ ?
19. Describe how to construct the *one-sample t interval for a population mean*?

20. Summarize the *three conditions for inference about a population mean*:

- Random
- Normal
- Independent

21. Inferences for *proportions* use \_\_\_\_\_ and inferences for *means* use \_\_\_\_\_.

22. What does it mean if an inference procedure is **robust**?

23. If the size of the SRS is less than 15, when can we use *t procedures* on the data?

24. If the size of the SRS is at least 15, when can we use *t procedures* on the data?

25. If the size of the SRS is at least 30, when can we use *t procedures* on the data?

26. Summarize the details of the four step procedure for estimating  $p$ :

- State
- Plan
- Do
- Conclude