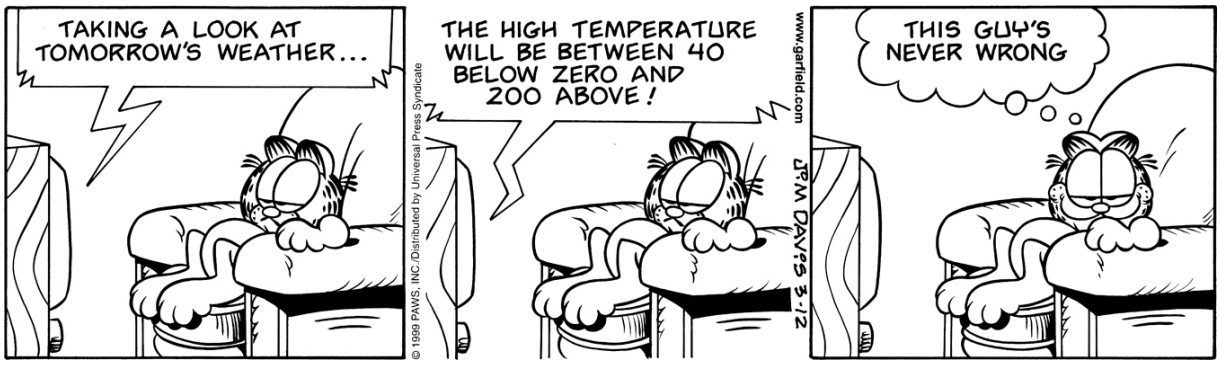
Chapter 8: Estimating with Confidence

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 μ.
    - 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:* $\hat{p}$?

2. Give the mean and standard deviation for the sampling distribution of $\hat{p}$?

3. How does the standard deviation differ to to standard error for the sampling distribution of $\hat{p}$?

4. Describe the sampling distribution of a sample proportion $\hat{p}$ 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 $\hat{p}$?

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 contruct 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 μ?

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 μ.

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 σ 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 $z^* \frac{\sigma}{\sqrt{n}} \le ME$. 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 Undertanding 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

The Practice of Statistics (4th Edition) - *Starnes, Yates, Moore*