Unit tests are written to evaluate student *comprehension, acquisition, and synthesis* of these skills. The problems listed as Assigned MyStatLab Problems are textbook exercises that appear in the assigned MyStatLab homework. Problems marked with an asterisk (*) are from a supplementary textbook and not the Sullivan text. The problems listed as Additional Suggested Problems are good practice problems which are located in the Sullivan text and can be viewed from the Chapter Contents within MyStatLab. Detailed solutions to the odd-numbered exercises and all solutions to the Chapter Reviews and Chapter Tests can be found in the Student's Solutions Manual under Chapter Contents in MyStatLab.

**Chapter 8: Sampling Distributions (continued from Unit 2)**

**Section 8.2: Distribution of the Sample Proportion**

- Describe the sampling distribution of the sample proportion including its shape (whether or not it is approximately normal), its center (mean of $p$), and its spread (standard error of $\sqrt{p(1-p)/n}$).
- Compute probabilities of a sample proportion in application problems.

**Assigned MyStatLab Problems:** 2, 3, 16, 18, 23, *7.1.3, *7.1.6, *7.1.10

**Additional Suggested Problems:** Chapter 8 Test #5 – 7

**Chapter 9: Estimating the Value of a Parameter**

**Section 9.1: Estimating a Population Proportion**

- Identify the target parameter in a study and recognize the difference between a point estimate and an interval estimate of the target parameter.
- Interpret a confidence interval as a range of plausible values for the parameter being estimated.
- Explain that the confidence level is the percentage of possible samples for which the resulting confidence interval will contain the true population parameter value.
- Construct and interpret a confidence interval for the population proportion $p$, including:
  1. Describing the population proportion $p$ that is being estimated in the context of the study.
  2. Stating and verifying the necessary conditions.
  3. Determining the critical value $z_{a/2}$ from the standard normal table needed to construct a confidence interval for $p$ for a given confidence level.
  4. Calculating the lower and upper endpoints of the interval using the appropriate formula.
  5. Interpreting the confidence interval in the context of the study.
- Identify the endpoints of a confidence interval for a population proportion from JMP output.
- Describe how increasing the confidence level affects the width of a particular confidence interval.
• Describe how increasing the sample size affects the width of a particular confidence interval.
• Determine the sample size necessary for estimating a population proportion within a specified margin of error.

**Assigned MyStatLab Problems:** 7, 11, 21, 27, 29, 33, 46, *8.2.22

**Additional Suggested Problems:** Chapter 9 Review #2 – 4 & 15; Chapter 9 Test #7

**Section 9.2: Estimating a Population Mean**

• Explain the purpose of the $t$-distribution and when it is used.
• Explain the differences and similarities between the standard normal and $t$-distributions.
• Construct and interpret a confidence interval for the population mean $\mu$, including:
  1. Describing the population mean $\mu$ that is being estimated in the context of the study.
  2. Stating and verifying the necessary conditions.
  3. Determining the appropriate degrees of freedom and the critical value from the $t$-table.
  4. Calculating the lower and upper endpoints of the interval using the appropriate formula.
  5. Interpreting the confidence interval in the context of the study.
• Identify the endpoints of a confidence interval for a population mean from JMP output.
• Determine the sample size necessary for estimating a population mean within a specified margin of error.

**Assigned MyStatLab Problems:** 7, 9, 13, 19, 23, 27, 31, 37, 43, 45, 50

**Additional Suggested Problems:** 15, 21, 29, 33, 35, 39, 47

**Chapter 10: Hypothesis Tests Regarding a Parameter**

**Section 10.1: The Language of Hypothesis Testing**

• Understand that the process of hypothesis testing involves using sample data to draw inferences about population parameters.
• State the null and alternative hypotheses for a given study objective.
• Describe a Type I error and its potential consequences in the context of a particular study.
• Describe a Type II error and its potential consequences in the context of a particular study.
• Understand that $\alpha$ represents the probability of making a Type I error and $\beta$ represents the probability of making a Type II error.
• Know the five steps in the hypothesis testing procedure.
• Understand that a test statistic represents the number of standard errors between an observed sample statistic and the value of the parameter specified by the null hypothesis.
• Interpret a $p$-value as the probability of observing a sample statistic that is at least as extreme (in the direction specified in $H_1$) as the one obtained in the study, if the null hypothesis is true.

**Assigned MyStatLab Problems:** 3, 5, 8, 9, 15, 17, 35, 37, 39, 42, 43

**Additional Suggested Problems:** Chapter 10 Review #1 – 3

### Section 10.2: Hypothesis Tests for a Population Proportion

- Conduct a formal hypothesis test for a population proportion, including:
  1. Stating the null and alternative hypotheses about the population proportion $p$, defining $p$ in the context of the study, and stating the chosen significance level $\alpha$.
  2. Stating and verifying the necessary conditions.
  3. Calculating the test statistic $z_0$ using the appropriate formula.
  4. Using the standard normal table to determine the $p$-value for either a right-tailed test, a left-tailed test, or a two-tailed test as appropriate.
  5. Making a decision about the null hypothesis by comparing the $p$-value to $\alpha$ and stating the conclusion about the alternative hypothesis in the context of the study.

- Identify the sample proportion, the test statistic, and the $p$-value from JMP output from a hypothesis test for a population proportion.

- Understand the relationship between confidence intervals and two-sided hypothesis tests.

**Assigned MyStatLab Problems:** 3, 17, 22, 23, 33, 43, 46, 47, *9.1.8, *9.2.11

**Additional Suggested Problems:** 13, 19, 21, 25, 31, 35, 37

### Section 10.3: Hypothesis Tests for a Population Mean

- Conduct a formal hypothesis test for a population mean, including:
  1. Stating the null and alternative hypotheses about the population mean $\mu$, defining $\mu$ in the context of the study, and stating the chosen significance level $\alpha$.
  2. Stating and verifying the necessary conditions.
  3. Calculating the test statistic $t_0$ using the appropriate formula.
  4. Determining the degrees of freedom and using the $t$-table to approximate the $p$-value for either a right-tailed test, a left-tailed test, or a two-tailed test as appropriate.
  5. Making a decision about the null hypothesis by comparing the $p$-value to $\alpha$ and stating the conclusion about the alternative hypothesis in the context of the study.
Identify the test statistic and p-value from JMP output from a hypothesis test for one mean.

Describe the limitations of hypothesis tests.

**Assigned MyStatLab Problems:** 7, 9, 19, 21, 23, 31, 35, *9.3.33, *9.3.32

**Additional Suggested Problems:** 11, 13, 15, 17, 25, 29

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**Chapter 11: Inferences on Two Samples**

**Section 11.2: Inference about Two Population Means – Dependent Samples**

- Identify the response variable and the explanatory variable in studies comparing two groups.
- Distinguish between a matched-pairs sample and independent samples.
- Describe the matched-pairs design.
- Construct and interpret confidence intervals about the population mean difference \( \mu_d \) of matched-pairs data, including:
  1. Describing the population mean difference \( \mu_d \) being estimated in the context of the study.
  2. Stating and verifying the necessary conditions.
  3. Determining the appropriate degrees of freedom and critical value from the \( t \)-table.
  4. Calculating the endpoints of a confidence interval for \( \mu_d \) using the appropriate formula.
  5. Interpreting the confidence interval in the context of the study.
- Explain if there is a statistically significant mean difference based on a confidence interval for \( \mu_d \).
- Identify the endpoints of a confidence interval for \( \mu_d \) from JMP output.
- Conduct a formal hypothesis test for comparing two population means based on matched-pairs data, including:
  1. Stating the null and alternative hypotheses about the population mean difference \( \mu_d \), defining \( \mu_d \) in the context of the study, and stating the chosen significance level \( \alpha \).
  2. Stating and verifying the necessary conditions.
  3. Calculating the test statistic \( t_0 \) using the appropriate formula.
  4. Determining the degrees of freedom and using the \( t \)-table to approximate \( p \)-value for either a right-tailed test, a left-tailed test, or a two-tailed test as appropriate.
  5. Making a decision about the null hypothesis by comparing the \( p \)-value to \( \alpha \) and stating the conclusion about the alternative hypothesis in the context of the study.
- Determine the test statistic and \( p \)-value for a paired \( t \)-test from JMP output.


**Additional Suggested Problems:** 9, 13, Chapter 11 Review #3 & 7