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MATH 54
Section 4053
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Final Exam Study Guide

Calculator

	Hypothesis Tests	Confidence Intervals
11.1	6: 2-PropZTest	B: 2-PropZInt
11.2	2: T-Test	8: TInterval
11.3	4: 2-SampTTest	Ø: 2-SampTInt
11.4	D: 2-SampleFTest	N/A

12.1	D: χ^2-GOF-Test
12.2	C: χ^2-Test
13.1	H: ANOVA

12.3 (extra credit) DISTR (2nd + VARS) → 8: χ^2-cdf

Ch 1 : Data Collection
- 1.1 Introduction to the Practice of Statistics
- 1.2 Observational Studies vs. Designed Experiments
- 1.3 Simple Random Sampling
- 1.4 Other Effective Sampling Methods
- 1.5 Bias in Sampling
- 1.6 The Design of Experiments

Ch 2 : Organizing and Summarizing Data
- 2.1 Organizing Qualitative Data
- 2.2 Organizing Quantitative Data: The Popular Displays
- 2.3 Additional Displays of Quantitative Data
- 2.4 Graphical Misrepresentations of Data

Ch 3: Numerically Summarizing Data
- 3.1 Measures of Central Tendency
- 3.2 Measures of Dispersion
- 3.3 Measures of Central Tendency and Dispersion from Grouped Data
- 3.4 Measures of Position and Outliers
- 3.5 The Five-Number Summary and Boxplots

Test 1

Ch 4: Describing the Relation between Two Variables
- 4.1 Scatter Diagrams and Correlation
- 4.2 Least-Squares Regression
- 4.3 Diagnostics on the Least-Squares Regression Line
- 4.4 Contingency Tables and Association

Ch 5: Probability
- 5.1 Probability Rules
- 5.2 The Addition Rule and Complements
- 5.3 Independence and the Multiplication Rule
- 5.4 Conditional Probability and the General Multiplication Rule
- 5.5 Counting Techniques

Test 2

Ch 6: Discrete Probability Distributions
- 6.1 Discrete Random Variables
- 6.2 The Binomial Probability Distribution

Ch 7: The Normal Probability Distribution
- 7.1 Properties of the Normal Distribution
- 7.2 Applications of the Normal Distribution
- 7.3 Assessing Normality

Ch 8: Sampling Distributions
- 8.1 Distribution of the Sample Mean
- 8.2 Distribution of the Sample Proportion

Test 3

Ch 9: Estimating the Value of a Parameter
- 9.1 Estimating a Population Proportion
- 9.2 Estimating a Population Mean
- 9.3 Estimating a Population Standard Deviation

Ch 10: Hypothesis Tests Regarding a Parameter
- 10.1 The Language of Hypothesis Testing
- 10.2 Hypothesis Tests for a Population Proportion
- 10.3 Hypothesis Tests for a Population Mean
- 10.4 Hypothesis Tests for a Population Standard Deviation

Test 4

Ch 11: Inferences on Two Samples
- 11.1 Inference about Two Population Proportions
- 11.2 Inference about Two Means: Dependent Samples
- 11.3 Inference about Two Means: Independent Samples
- 11.4 Inference about Two Population Standard Deviations

Ch 12: Inference on Categorical Data

- 12.1 Goodness-of-Fit Test
  - ★ all are right-tailed tests
  - ★ $df = K - 1$
- 12.2 Tests for Independence and the Homogeneity of Proportions
  - ★ all are right-tailed tests
  - ★ $df = (r-1)(c-1)$
  - ($H_0: p_1 = p_2 = p_3$)

Ch 13: Comparing Three or More Means

- 13.1 Comparing Three or More Means (One-Way Analysis of Variance) (ANOVA) ($H_0: \mu_1 = \mu_2 = \mu_3$)

Final Exam

HT

11.1 Step 0) Conditions:

① simple random sample or completely randomized experiment w/ 2 levels of treatment ④ $n_1 \leq 0.05N_1$ and $n_2 \leq 0.05N_2$

② samples are independent

③ $n_1\hat{p}_1(1-\hat{p}_1) \geq 10$ and $n_2\hat{p}_2(1-\hat{p}_2) \geq 10$

1) "

2) "

3) "

4) "

5) "

CI

"

Sample Size

$$n = n_1 = n_2 = [\hat{p}_1(1-\hat{p}_1) + \hat{p}_2(1-\hat{p}_2)]\left(\frac{z_{\alpha/2}}{E}\right)^2 \quad \text{(rounded up)}$$

$$n = n_1 = n_2 = 0.5\left(\frac{z_{\alpha/2}}{E}\right)^2 \quad \text{(rounded up)}$$

11.2 HT (like 10.3)

Step 0) Conditions:

① simple random sample or matched-pairs design experiment

② sample data are dependent (matched pairs)

③ differences are normally distributed w/ no outliers or sample size is large ($n \geq 30$)

④ $n \leq 0.05N$

1) $H_0: \mu_d = 0$ $H_0: \mu_d = 0$ $H_0: \mu_d = 0$

$H_1: \mu_d \neq 0$ $H_0: \mu_d < 0$ $H_1: \mu_d > 0$

2) "

3) "

4) "

5) "

CI (like 9.2)

"

Sample Size

N/A

11.3 HT

Step 0) Conditions:

① simple random sample or completely randomized experiment w/ 2 levels of treatment

② samples are independent

③ populations normally distributed or sample sizes are large ($n_1 \geq 30$ and $n_2 \geq 30$)

④ $n_1 \leq 0.05 N_1$ and $n_2 \leq 0.05 N_2$

Step 1) "

2) "

3) "

Note: use smaller of $n_1 - 1$ or $n_2 - 1$ degrees of freedom

4) "

5) "

CI

"

Sample Size

N/A

11.4 HT

Step 0) Conditions:

① simple random sample or randomized experiment

② sample data are independent

③ populations normally distributed

1) "

2) "

3) "

Note: use $n_1 - 1$ df in the numerator and $n_2 - 1$ df in the denominator

4) "

5) "

CI

N/A

Sample Size

N/A

12.1 GOF Test

Step 1) H_0: The random variable follows a certain distr.

H_1: The random variable does not follow the distr. in H_0.

2) "

3) a) Calculate E_i

b) Conditions:

① all $E_i \geq 1$

② no more than 20% less than 5

c) Compute test statistic

d) Determine critical value

★ all are right-tailed tests

★ use $k-1$ df

4) "

5) "

12.2 Test for Independence

Step 1) H_0: The row and column variable are independent.

H_1: The row and column variable are dependent.

2) "

3) a) "

b) Conditions:

① "

② "

c) "

d) Determine the critical value

* all are right-tailed
* use $(r-1)(c-1)$ df

4) "

5) "

Test for Homogeneity of Proportions

Step 1) H_0: $p_1 = p_2 = p_3$

H_1: At least one of the proportions is different from the others

2) "

3) a) "

b) Conditions:

① "

② "

c) "

d) "

* "

* "

4) "

5) "

13.1 One-Way ANOVA Test

Step 0) Conditions:

① k simple random samples or randomized experiment w/ k treatments

② k samples must be independent

③ populations must be normally distributed

④ populations must have equal variances (or largest sample std. dev. is no more than twice the smallest std. dev)

1) H_0: $\mu_1 = \mu_2 = \mu_3$

H_1: at least one population mean is different from the others

2) "

3) compute F-Test Statistic
(no critical value)

Classical

4) If F_0 is large, reject H_0

5) "

P-value

4) If P-value $< \alpha$, reject H_0.
↑ from technology