

Comp. Public Health Stat Midterm / F00

Part A (Closed Book)

1. Briefly, describe several differences between the traditional test-based method of data analysis and the more modern exploratory-based approach. (Answer on the back of this page.) [8 pts]

ANS:

| Traditional Test-Based Methods | Modern Exploratory-Based Methods |
|---|--|
| Developed to address experimental studies | Developed to address all types of studies |
| Use data once and toss | OK to reuse data (repeated explorations and confirmations) |
| Emphasizes hypothesis testing | Combines detection with confirmation |
| Tests often assume normality | Tests are “robust” |

2. What is the probability of a type II error called? NS: “beta”
3. What Greek symbol used to denote a *population* mean difference based on paired samples? ANS: μ_d
4. Other than the variance and standard deviation, name a measure of spread. ANS: IQR
5. What is the name of the procedure used to test for differences in population variances? ANS: Bartlett’s tests or *F* ratio test
6. Name a non-parametric analogue to the independent *t* test. ANS: Mann-Whitney test, Kruskal-Wallis test, Wilcoxon, or “*t* test based on ranks”
7. List *two* different types of information you’d put into a data documentation (DD) file? ANS: (a) data file name and location (b) variable names (c) variable types (d) variable codes and units of measure (d) dates of creation and modification
8. What is the pooled estimate of variance (s_p^2) called in an ANOVA table? ANS: the Mean Square Within
9. How many degrees of freedom does an independent *t* test have when there are 20 people in each group? ANS: 38
10. What points (statistics) comprise a 5-point summary? ANS: minimum, 25th percentile, median, 75th percentile, maximum (i.e., Q0, Q1, Q2, Q3, Q4)

Comp. Public Health Statistics Exam

Part B (Procedure Notebook)

Problem

SMSS: A social psychologist develops a scale that she calls the Stop Making Sense Scale (SMSS). She theorizes that SMSS, a strong predictor of coping with the absurdities of life, is a beneficial behavior for long-term happiness and contentment. Data for two groups of people are shown below.

Group 1: 56, 45, 67, 53, 49, 59

Group 2: 58, 39, 44, 48, 49, 38

1. Computerize the data in preparation for analysis.[5 pts]
2. Report the mean, standard deviation, and sample size of each group. Interpret your results. [5 pts]

ANS:

Group 1: mean = 54.8 (without rounding, 54.833), $s = 7.8$ (7.7567), $n = 6$

Group 2: mean = 46.0 (46.000), $s = 7.4$ (7.4027), $n = 6$

Group 1 has values that are higher on average. The groups have comparable variability.

3. Calculate a 95% confidence interval for $\mu_1 - \mu_2$. Show work. Interpret your results. [5 pts]

ANS:

$$s_p = \sqrt{57.4833} = 7.5718$$

$$se = 7.5718 * \sqrt{1/6 + 1/6} = 4.3773$$

$$95\% \text{ confidence interval for } \mu_1 - \mu_2 = (54.83 - 46.00) \pm (t_{10,.975})(se) = 8.83 \pm (2.23)(4.38) = 8.83 \pm 9.76 = (-0.93, 18.59).$$

Interpretation: The *population* mean difference lies between -0.93 and 18.59, with 95% confidence.

4. Perform a test to determine whether the group means differ significantly. Let $\alpha = .05$. Report all hypothesis testing steps (H_0 , H_1 , etc.) Show work. Interpret your findings. [5 pts]

ANS:

$$H_0: \mu_1 - \mu_2 = 0 \text{ vs. } H_1: \mu_1 - \mu_2 \neq 0; \alpha = .05$$

$$t = 2.02 \text{ with } 10 \text{ df; } p \text{ (two-sided)} = .071$$

Conclusion: Retain the null hypothesis No significant difference between groups.

5. What was the power of this analysis to uncover a significant mean difference of 5? Interpret the power analysis.

$$\text{Power} = \Phi \left(-1.96 + \frac{\sqrt{6}(5)}{\sqrt{7.7567^2 + 7.4027^2 / 1}} \right) = \Phi(-0.82) = .21. \text{ The analysis was insufficiently powered to}$$

show a difference with good reliability.