

## 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:  $\mu_d$
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, 25<sup>th</sup> percentile, median, 75<sup>th</sup> 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.