PART 1: General Issues

1.   Define the following basic statistical concepts: a) mean; b) median; c) mode; d) standard deviation; and e) variance.

2.   Explain the distinction between descriptive and inferential statistics.

3.   Explain the distinction between univariate and multivariate statistics.

4.   Explain the differences between parametric and non-parametric analyses.

5.   What are "scales of measurement"? How many are there? How do they differ from each other?

6.   Under what circumstances would a researcher conduct the following statistical tests: a) Chi-square; b) t-test for independent means; c) paired sample means; d) One-way analysis of variance; e) Pearson correlation; and f) multiple regression.

PART 2: Statistics and Research Design

For each of the studies described below answer the following questions:

a) What is the independent variable?

b) What is the dependent variable?

c) What statistical test should you use to analyze the question (be specific)?

d) What factors did you take into account to determine the correct test to use?

1.   A responsible University Vice-President decides that it would be a fine idea for new faculty to be able to predict with some degree of accuracy the income they could earn later in their career. To do this, the Vice-President samples a group of 200 faculty members who differ in their years of employment and records their salary. Predictions are drawn from these data.

2.   In an old study by Clark and Clark (1939), the authors wanted to determine whether black children showed some racial preference toward the majority group. To do this, a randomly selected group of black children were shown black dolls and white dolls and

were asked to select the one with which they wished to play. Out of 252 children, 169 chose the white doll and 83 chose the black doll.

3.   As part of a program to reduce smoking, a national organization ran an advertising campaign to convince people to quit smoking. To evaluate the effectiveness of their campaign, they had 150 participants record the number of cigarettes smoked per day in the week before and the week following exposure to the advertisement.

4.   In order to test the hypothesis that French Canadian men are shorter than men from other Canadian ethnic groups, you collected height data on a random sample of 25 French Canadian males and 25 Canadian males from other ethnic groups. The average height of the French Canadian sample is 164 centimeters, with a standard deviation of 15 cm. The second sample averages 171 centimeters with a standard deviation of 24 cm.

5.   An investigator wishes to test the effects of leadership style on employee satisfaction. Through his work contacts, he identifies a branch of a company that has three supervisors who have very different leadership styles - one is passive and indecisive, a second is charismatic and energetic, the third supervisor is authoritarian. He randomly samples 40 employees who work with each supervisor (120 employees in total) and asks them to complete the Barling Job Satisfaction scale which rates employee satisfaction on 10 different aspects of their work. The scale items are combined and create a scale that varies from 0 to 100, with higher scores indicating more satisfactions.

PART 3: Conceptual Questions

1.   Why is it impossible to obtain a value less than zero when calculating the Sum of Squares?

2.   When you compute the Sum of Squares for a set of scores, will you get the same answer if the set of scores comes from a sample versus a population?

3.   If the values for several scores in the middle of a distribution were changed, would the

range or standard deviation be more affected?

4.   I am correct when I state that as our sample size decreases, our ability to estimate population values increases? Why?

5.   What is the difference between a z distribution and a t distribution?

6.   If you estimate that the correlation between grades and depression is equal to $r = -.25$, what can you state in your own words about the relation between these two variables?

7.   In some instances, the median is a better measure of central tendency than is the mean (which is usually the most widely used central tendency measure). Under what circumstances is the median a better estimate?

8.   Will transforming a set of values into z-scores change the shape of the distribution?

9.   What is the advantage of bivariate regression over bivariate correlation?

10.   Under what circumstances would a person use a Two-Way Analysis of Variance?

11.   What is the difference between a between subjects and a within subjects design?