DA 6823

Kilger

Module 1: Part #1 (50 points)

**The Power of Statistics + the Levels of Measurement + the Different Classes of Variables and Determining Appropriate Statistical Technique + Basic Descriptive Measures**

**General Instructions:** In your own words, answer each of the following questions - don’t copy (e.g., cut and paste) some definition out of a book word for word. This is not a group project – you are expected to complete this module on your own. You may refer to textbooks, online or other sources but not your fellow classmates. If you don’t understand the question, feel free to ask the instructor in class, in office hours or in an email.

1. **Provide a short definition for dependent variable. (3 points)**

A dependent variable is a variable that is influenced by another variable. This is a variable of interest within the context of analysis.

1. **Provide a short definition for independent variable. (3 points)**

An independent variable is a variable that is not influenced by another variable; rather, it influences the level of a dependent variable.

1. **Provide a short definition for control variable. (3 points)**

A control variable is a variable that is constant and unchanged. This is a variable that is thought to influence the dependent variable; however, it is not of importance.

1. **Be able to describe the simple criteria for each of the four levels of measurement:** 
   1. **Nominal (2 points)**

This level of measurement describes a variable that can be placed into categories.

* 1. **Ordinal (2 points)**

This level of measurement describes a variable that has categories that can be ordered from low to high or high to low.

* 1. **Interval (2 points)**

This level of measurement describes a variable that has categories that are equidistant from each other.

* 1. **Ratio (2 points)**

This level of measurement describes a variable that has an absolute zero point.

1. **Provide an example of a variable for each of the four measurement levels below.**
   1. **Nominal (2 points)**
   * Gender (Male, Female)
   * Political Affiliation (Republican, Democrat, Green, Libertarian)
   1. **Ordinal (2 points)**
   * Starbucks Drink Sizes (12 ounces, 16 ounces, 20 ounces)
   * Tournament Rankings (1st Place, 2nd Place, 3rd Place)
   1. **Interval (be careful – be sure it is interval and not ratio!) (2 points)**
   * Celsius/Fahrenheit Temperature Scale
   * Calendar Dates
   1. **Ratio (2 points)**
   * Annual Sales
   * Market Share
   * Distance Travelled
2. **Name at least two criteria from the IDRE chart that are used in determining which statistical technique can be used in a situation. (3 points)**

* Number of Dependent Variables
* Nature of Independent Variables

1. **Briefly explain the difference between descriptive and inferential statistics. (4 points)**

Descriptive statistics summarize the characteristics of a dataset; therefore, they do not allow us to make conclusions beyond the summarized data. Inferential statistics enable the testing of a hypothesis by analyzing data from samples and making generalizations about a population.

1. **Almost every statistical technique you will come across has some sort of assumptions – even non-parametric statistics.** 
   1. **Name one benefit that assumptions of a test provide you (2 points)**

* Allow you to draw reliable interpretation and conclusions from research
  1. **Name one cost that assumptions of a test carry (2 points)**
* Choosing an incorrect assumption may generate wildly inaccurate conclusions

1. **What happens if you violate the assumptions of a statistical test? Do the statistical police come and arrest you? (4 points)**

When the assumptions of a statistical test are violated, the results of the analysis may be misleading or completely inaccurate. The statistical police will not come and arrest you.

1. **Using the IDRE chart, suggest the appropriate statistical test for each of the following business cases**
   1. **As a maker of colored contact lenses, you think that there may be relationship between the color of the contact lenses purchased and the gender of the purchaser. (2 points)**

**Test Selection:** Chi-square test and Fisher’s exact test

* **Independent Variable:** Gender of Purchaser
* **Dependent Variable:** Color of Contact Lenses Purchased
* **Number of Dependent Variable:** 1
* **Nature of Independent Variables:** 1 IV with 2 Levels (independent groups)
* **Nature of Dependent Variable:** Categorical
  1. **As an auctioneer of fine art, you think that there may be a different between the price paid for a piece of art between men and women. (2 points)**

**Test Selection:** 2 independent sample t-test

* **Independent Variable:** Gender
* **Dependent Variable:** Price Paid for Art
* **Number of Dependent Variable:** 1
* **Nature of Independent Variables:** 1 IV with 2 Levels (independent groups)
* **Nature of Dependent Variable:** Interval and Normal
  1. **You want to better understand how different versions and price mixes of your product – the Vegematic – have on the number of product sold. You hypothesize that color of product, price, region of the country (North, South, East, West), gender of purchaser, household income of purchaser have an effect on the number of pieces sold. You may also want to make some predictions about how many products would be sold under various levels of these variables. (2 points)**

**Test Selection:** multiple regression and analysis of covariance

* **Independent Variable:** Product Color, Product Price, Country Region (North, South, East, West), Purchaser Gender, Purchaser Household Income
* **Dependent Variables:** Number of Product Sold
* **Number of Dependent Variable:** 1
* **Nature of Independent Variables:** 1 or more interval IVs and/or 1 or more categorical IVs
* **Nature of Dependent Variable:** interval & normal
  1. **As publisher of the popular magazine Rabbit Times, you think that there may be a relationship between the number of pages in the magazine and the number of copies of that issue sold. How do you find out the direction and how strong this relationship might be? (2 points)**

**Test Selection:** correlation and simple linear regression

* **Independent Variable:** Number of Pages in the Magazine
* **Dependent Variables:** Number of Copies Sold
* **Number of Dependent Variable:** 1
* **Nature of Independent Variables:** interval
* **Nature of Dependent Variable:** interval and normal

**How do you find out the direction and how strong this relationship might be?**

Correlation

* 1. **You are the maker of FelineHair – a hair growing drug for hairless cats. You want to test your drug against three other drugs to see which one grows the most hairs on the cats in the experiment. You also want to see if there are other differences in the effectiveness depending upon the gender of the cat and what color coat the cat has. You end up with a drug (4) x cat gender (2) by cat coat color (black, white, brown) experimental design. What analysis technique would you use for this experiment? (2 points)**

**Test Selection:** factorial ANOVA

* **Independent Variable:** Drug (4 total), Cat Gender (Male, Female), Cat Coat Color (Black, White, Brown)
* **Dependent Variables:** Hair Count
* **Number of Dependent Variable:** 1
* **Nature of Independent Variables:** 2 or more IVs (independent groups)
* **Nature of Dependent Variable:** interval & normal