Statistical significance, hypothesis testing, type i and type ii errors

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Assignment Byline Statistics The Concepts: According to the book “ Elementary Statistics,” there are several important concepts that are a part of hypothesis testing. Hypothesis testing is defined as “ a decision making process for evaluating claims about a population” (Bluman 2003). Within this particular type of statistical testing, there are two distinct hypotheses known as null and alternative. A null hypothesis is a situation where no differences exist between two parameters. An alternative hypothesis, on the other hand, indicates that there is a significant difference between two particular parameters (Bluman 2003). When completing hypothesis testing there are two types of errors that may occur: a Type 1 or a Type 2 error. A Type 1 error occurs when the null hypothesis is rejected even though it was true (Bluman 2003). A Type 2 error occurs when the null hypothesis is accepted or not rejected even though it was false (Bluman 2003). An example of a Type 1 error would be a pregnancy test that indicates a person is not pregnant when they actually are. A Type 1 error probability is denoted by an alpha or the Greek symbol of ?. This is in contrast to the Type 2 error, which is denoted by beta or the Greek symbol of ?. An example of a Type 2 would be a pregnancy test that indicates a person is pregnant when they are not. According to the article entitled “ Statistics Tutorial: Power of a Hypothesis Test,” “ the probability of not committing a Type II error is called the power of a hypothesis test”(“ Statistics tutorial: power of a hypothesis test”). Finally, the statistical significance relates to the probability level of “ committing” the Type 1 error within a hypothesis test (Bluman 2003). The power of a particular statistic, in contrast, is helpful in determining the likelihood of committing a Type 2 error. Alpha and Power The concept of alpha in statistics is important to hypothesis testing as it allows a person to

see the likelihood of rejecting a true null hypothesis otherwise known as a Type 1 error. According to the article entitled “ What do alpha and beta refer to in statistics?” the alpha will only range between 0 and 1(“ What do alpha and beta refer to in statistics?”). Calculating a zero for this indicates that there is zero probability that a Type 1 error will occur. If a one is calculated, it is very likely that a Type 1 error will occur. The power concept relates to the probability of not committing a Type 2 error. Several aspects of a hypothesis test including the sample size, the statistical significance level, and the “ true value of the parameter” affect the power (“ Statistics tutorial: power of a hypothesis test”). The higher the power of a test is so too is it less likely that a Type 2 error will occur. How these concepts relate to each other: Hypothesis testing is a method by which statistical questions that involve parameters may be answered. It is within this type of testing that the person calculating will hypothesize that the results will be alternative or null meaning that there will be a correlation between a parameter and a value or there will not be. Once the calculations are completed, the person performing the hypothesis testing will reach a verdict about their question. Their determination can result in a Type 1 error. They can also have a Type 2 error where they accept the null hypothesis even though it is false or incorrect. This situation would be considered a false positive. The statistical significance is helpful in deciding the probability of a Type 1 error whereas the power of a test helps to determine the probability of a Type 2 error. Of course, it is possible to end up without an error when performing a hypothesis test, although it is more common than not. References Bluman, A. G. (2003). Elementary statistics: a brief version (2nd ed.). Boston: McGraw-Hill. Salkind, N. J. (2010). Statistics for people who (think they) hate

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