

Question 1: Explain what inferential statistics are. Provide a sample research question (from your thesis or from anything else) that could be answered with inferential statistics.

- Inferential statistics allow you to test a hypothesis or assess whether your data is generalizable to the broader population. It is a statistical method that deduces from a small but representative sample the characteristics of a bigger population. Hypothesis testing, confidence intervals, regression analysis, analysis of variance (ANOVA), and chi-square tests are examples of inferential statistics tools. Inferential examples include the mean SAT scores of 11th graders in the United States.

Question 2: Compare and contrast a Type 1 and Type II error in statistics. Why do we want to avoid these?

- A type I error (false-positive) occurs if an investigator rejects a null hypothesis that is true in the population; a type II error (false-negative) occurs if the investigator fails to reject a null hypothesis that is actually false in the population. A similarity between the two is that they both involve a rejection and probability. We want to avoid these because there's a risk of making each type of error in every analysis, and the amount of risk is in your control. Type 1 has a huge impact on conversions. Type 2 gives a false negative.

Question 3: How can one reduce the chance of a Type I error? Type II error? Describe a few for each.

- To decrease the probability of a Type I error, decrease the significance level. If you want a higher level of statistical significance, you'll need a larger sample size. Changing the sample size has no effect on the probability of a Type I error. A type II error can be reduced by making more stringent criteria for rejecting a null hypothesis, although this increases the chances of a false positive. The sample size, the true population size, and the pre-set alpha level influence the magnitude of risk of an error.

Question 4: What is the difference between a one-sample and two-sample hypothesis test?

- One sample test is done when we have one population and a sample is drawn from that population, but the two-sample test needs two population for testing hypothesis. A one-sample t-test compares a single population to a standard value. It also compares the mean of a sample to a pre-specified value and tests for a deviation from that value. A two-sample hypothesis test is used to analyze the difference between two unknown population means.