For Z-Test:

1. Z-Test:
   * Example: You are conducting a study to compare the mean heights of male and female students in a university. You collect a sample of 100 male students and find that their mean height is 175 cm with a standard deviation of 5 cm. For 120 female students, the mean height is 165 cm with a standard deviation of 4 cm. What statistical test would you use to determine if there is a significant difference in the mean heights between these two groups?
2. Z-Test:
   * Example: A manufacturing company claims that the mean weight of their product is 500 grams. To test this claim, a sample of 50 products is taken, and the mean weight is found to be 490 grams with a standard deviation of 20 grams. What statistical test would you use to assess whether the mean weight of the products differs significantly from the claimed value?

For T-Test:

1. Independent T-Test:
   * Example: A researcher is investigating whether there is a significant difference in exam scores between students who attended an after-school tutoring program and those who did not. They randomly select 30 students from each group and administer the same exam. The mean exam score for the tutoring group is 85 with a standard deviation of 10, while the mean exam score for the non-tutoring group is 78 with a standard deviation of 8. What statistical test would you use to compare the mean exam scores of these two groups?
2. Paired T-Test:
   * Example: A pharmaceutical company is testing a new drug's effectiveness in lowering blood pressure. They measure the blood pressure of the same group of patients before and after taking the drug. For a sample of 20 patients, the mean systolic blood pressure before taking the drug is 140 mmHg with a standard deviation of 15 mmHg, and after taking the drug, the mean systolic blood pressure is 130 mmHg with a standard deviation of 14 mmHg. What statistical test would you use to determine if there is a significant difference in blood pressure before and after taking the drug?

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For One-Way ANOVA:

Example: A researcher wants to compare the effectiveness of three different teaching methods (Method A, Method B, and Method C) in improving students' math test scores. They randomly assign 30 students to each teaching method. After completing the teaching sessions, they administer a standardized math test to all students. The test scores are recorded as follows:

Method A: Mean = 75, Standard Deviation = 10 Method B: Mean = 80, Standard Deviation = 12 Method C: Mean = 72, Standard Deviation = 8

Is there a significant difference in the mean test scores among the three teaching methods?

For Two-Way ANOVA:

Example: A company wants to analyze the effect of two factors, temperature (low, medium, high) and humidity (low, medium, high), on the yield of a chemical process. They conduct an experiment where they vary temperature and humidity levels and record the yield of the process. The results are summarized in the following table:

| **Temperature** | **Humidity** | **Yield** |
| --- | --- | --- |
| Low | Low | 80 |
| Low | Medium | 85 |
| Low | High | 75 |
| Medium | Low | 90 |
| Medium | Medium | 95 |
| Medium | High | 85 |
| High | Low | 70 |
| High | Medium | 75 |
| High | High | 65 |