1. A sample of 12 pieces of data is collected, and we wish to perform the **level test** H0 vs. Ha. The population standard deviation is known to be 0.30. The sample mean is used to calculate the data z value of 1.75.
    a) **Determine the p-value.**

    b) **If the true population mean is 4.2, was an error made in this test? If so, which type?**

    c) **If the true population mean is 4.0, was an error made in this test? If so, which type?**

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2. A sample of 15 pieces of data is collected, and we wish to perform the **level test** H0 vs. Ha. The population standard deviation is known to be 0.35. The sample mean is used to calculate the data z value of -2.45.
    a) **Determine the p-value.**

    b) **If the true population mean is 3.6, was an error made in this test? If so, which type?**

    c) **If the true population mean is 4.0, was an error made in this test? If so, which type?**

1. Suppose that we are testing H0:μ=5 vs. Ha:μ≠5 at the 0.05 level, and we are going to collect 12 pieces of data with a known population standard deviation of 0.3.
    a) **Determine the probability of Type II error for the alternative μ=5.**
    Probability of Type II error = _____

    b) **Determine the probability of Type II error for the alternative μ=4.8.**
    Probability of Type II error = _____

    c) **Determine the probability of Type II error for the alternative μ=6.0.**
    Probability of Type II error = _____

2. Suppose that we are testing H0:μ=10 vs. Ha:μ≠10 at the 0.01 level, and we are going to collect 15 pieces of data with a known population standard deviation of 0.5.
    a) **Determine the probability of Type II error for the alternative μ=10.4**
    Probability of Type II error=Probability of Type II error= _____

    b) **Determine the probability of Type II error for the alternative μ=9.6**
    Probability of Type II error=Probability of Type II error= _____

    c) **Determine the probability of Type II error for the alternative μ=11.0**
    Probability of Type II error=Probability of Type II error= _____

1. Suppose that we assume the population standard deviation is 0.4, and we are testing H0:$\mu=3$ vs. Ha:$\mu\neq3$. We want the following powers (probability of detection):
   - Power ($\beta=0.80$) with D=0.4
   - Power ($\beta=0.90$) with D=0.5

   How much data is needed to satisfy both power requirements?

   We would need a sample size of n=50 to meet both power conditions.

2. Suppose that we assume the population standard deviation is 0.6, and we are testing H0:$\mu=8$ vs. Ha:$\mu\neq8$. We want the following powers (probability of detection):
   - Power ($\beta=0.75$) with D=0.5
   - Power ($\beta=0.95$) with D=0.7

   How much data is needed to satisfy both power requirements?

   We would need a sample size of n=45 to meet both power conditions.

3. Suppose that we assume the population standard deviation is 0.3, and we are testing H0:$\mu=7$ vs. Ha:$\mu\neq7$. We want the following powers (probability of detection):
    - Power ($\beta=0.60$) with D=0.3
    - Power ($\beta=0.85$) with D=0.5
    - Power ($\beta=0.95$) with D=0.7

    How much data is needed to satisfy all three power requirements?

    We would need a sample size of n=120 to meet all three power conditions.