Math 10 Hypothesis Testing 1   **ANSWERS**

Think about the context of the claim. *Determine* whether you want to support or reject the claim.

   a. State the null and alternative hypotheses in words.
   b. Write the null and alternative hypotheses in appropriate symbols
   c. Describe in words Type I error (the consequence of rejecting a true null hypothesis.)
   d. Describe in words Type II error (the consequence of failing to reject a false null hypothesis.)

1. You represent a chemical company that is being sued for paint damage to automobiles. You want to support the claim that the mean repair cost per automobile is more than $650. How would you write the null and alternative hypotheses?

   Ho: $\mu \leq 650$ (cost is no more than $650)   Ha: $\mu > 650$ (Cost is more than $650)

   Type I Error – Claim cost is more than $650, when it actually is not more than $650

   Type II Error – Cost is more than $650, but fail to reject the claim that is not more than $650.

2. You are on a research team that is investigating the mean temperature of adult humans. The commonly accepted claim is that the mean temperature is about 98.6°F. You want to show that this claim is false. How would you write the null and alternative hypotheses?=

   Ho: $\mu = 98.6$ (Normal Temp is 98.6F)   Ha: $\mu \neq 98.6$ (Normal Temp is not 98.6F)

   Type I Error – Claim normal temperature is not 98.6F, when it actually is 98.6F

   Type II Error – Normal Temperature is not 98.6F, but fail to detect that.

3. A light bulb manufacturer claims that the mean life of a certain type of light bulb is at least 750 hours. You are skeptical of this claim and want to refute it.

   Ho: $\mu \geq 750$ (Bulbs last at least 750 hours) Ha: $\mu < 750$ (Bulbs last less than 750 hours)

   Type I Error – Incorrectly claim light bulbs last less than 750 hours

   Type II Error – Fail to detect that light bulbs last more than 750 hours

4. As stated by a company's shipping department, the number of shipping errors per million shipments has a standard deviation that is less than 3. Can you support this claim?

   Ho: $\mu \geq 3$ (Standard Deviation of shipping errors is at 3) Ha: $\mu < 3$ (Standard Deviation of errors is under 3)

   Type I Error – Incorrectly claim Std Dev of Shipping errors is under 3

   Type II Error – Fail to detect that Std Dev of errors is under 3

5. A research organization reports that 33% of the residents in Ann Arbor, Michigan are college students. You want to reject this claim.

   Ho: p=0.33 (33% of residents are college students)   Ha: p ≠0.33 (It's not true 33% of residents are students)

   Type I Error – Incorrectly claim percentage of residents who are college students is not33%

   Type II Error – Fail to detect that residents who are college students is not33%

6. The results of a recent study show that the proportion of people in the western United States who use seat belts when riding in a car or truck is under 84%. You want to support this claim.

   Ho: p≥0.84 (At least 84% of west people use seat belts)   Ha: p <0.84 (Less than 84% use seat belts)

   Type I Error – Incorrectly claim less than 84% of people in west use seat belts

   Type II Error – Fail to detect that less than 84% of people in west use seat belts