

## 6.5.1: Exercises

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1. The Department of Motor Vehicles for a large city claimed that 80% of candidates pass driving tests. A local newspaper randomly surveyed 90 teens who had taken the test. They found that only 61 of the teens passed (68%). The researcher at the newspaper conducted a hypothesis test to determine if the passing rate for teens is lower than the proportion the DMV reported. He found a Z-score of -2.85 which corresponded to a P-value of 0.0022.
  - a. Write a conclusion to the researcher's hypothesis test. Be sure to make the conclusion easy for the readers of the newspaper to understand.
  
  
  
  
  
  
  
  
  
  
  - b. Based on the conclusion, what type of error may have occurred? Write the error in context.
  
  
  
  
  
  
  
  
  
  
2. In 2021-2022, 12% of employed people in the US reported belonging to a labor union. Officials in a large city randomly surveyed a sample of 120 and found that 18 reported belonging to a labor union.
  - a. State the null hypothesis.
  
  
  
  
  
  
  
  
  
  
  - b. Officials conduct a hypothesis test (at a 5% level of significance) to determine if the union membership rate in the city is different from the national rate. They determine that the P-value is 0.3125. State the conclusion in context.
  
  
  
  
  
  
  
  
  
  
  - c. Based on the conclusion in b, what type of error may have occurred? Write the error in context.

- d. A private tech company decides to research labor membership in the large metropolitan area where the company is based. They use their vast resources to conduct a survey of 1200 employed people and get a sample proportion of 0.15. What will happen to the standard error when the sample size increases?
- e. The private tech company finds a P-value of 0.0014. They reject the null hypothesis in support of the alternative hypothesis. They conclude that the sample proportion is statistically significant. Do you believe that there is practical significance? Show the difference between the sample proportion (15%) and the assumed population proportion (12%) in your justification.