Individual Assignment 9:

9.1.1 Given a claim about a mean, determine null and alternative hypotheses
9.1.2 Given a claim about a proportion, determine null and alternative hypotheses
9.2.1 Describe Type I and Type II errors for a given hypothesis
9.4.1 State a conclusion to a hypothesis test in statistical terms and in context

Stating Hypotheses and Conclusions

For questions #1 - 3, define the population parameter and then state the null and alternative hypotheses.

1. According to the 2020 Hologic Women's Global Health Index published in September 2021, thirty-eight percent of women said they experienced a lot of stress the day before they were surveyed. To see if stress increased in 2021, what would be the hypotheses to be tested?

2. "Average Salary By Education Level: The Value of a College Degree" was published by Northeastern University in June 2020. The article reported data from the U.S. Bureau of Labor Statistics and said "average weekly pay for those with a bachelor's degree was $1248". To see if average weekly pay was different in Canada than in the United States, what would be the hypotheses to be tested?

3. A college campus newspaper states that 80% of its student body is fully vaccinated against COVID. However, you suspect that it is less than 80%. What hypotheses would be tested to see if your suspicions were correct?

For questions #4 - 6, describe the errors in stating the null and alternative hypotheses for each hypothesis test.

4. A change has been made that should improve student satisfaction with parking. Let's assume that before the change, 37% of students approve of the parking that is provided. Fifty students were randomly selected and in the sample 21 approve of the parking that is provided. Is this sufficient evidence that student satisfaction has improved over the previous satisfaction level?

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H_0: p > 0.42
H_a: p = 0.37

5. An environmental group decides to test the water in their community due to concerns about the amount of lead in the drinking water. In previous years the mean amount of lead in the water was 5 ppb (parts per billion). They want to determine if the mean amount of lead has decreased.

   H_o: $\bar{x}$ = 5
   H_a: $\bar{x}$ > 5

6. According to The Institute for College Access and Success, 69% of graduates with a Bachelor's degree in 2016 had student loan debt. You suspect that percentage is bigger today.

   H_0: μ = 69
   H_a: μ > 69

7. Explain the difference between a one-tail hypothesis test and a two-tail hypothesis test.

8. To see if there has been a change in the percentage of people in the United States who vape, a two-tail hypothesis test was done. The area in one tail was 0.04. Is this enough evidence to reject the null hypothesis at the 5% level of significance? Explain.

9. On April 5, 2021, Gallup reported "Global Warming Attitudes Frozen Since 2016". They stated: "6 in 10 U.S. adults think effects of global warming are already happening". The 95% confidence interval was (0.56, 0.64). Let p be is the true proportion of adults who think the effects of global warming are already happening.

   a. Does this interval provide enough evidence to conclude p > 0.50?

   b. Does this interval provide enough evidence to conclude p = 0.60?

10. Describe a Type I and a Type II error for the following hypotheses and a consequence of each.

    H_0: The student taking the exam did not cheat on the exam.

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H_a: The student taking the exam did cheat on the exam.

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