

Question 1

For each of the following sets of hypotheses, determine whether committing a Type I error or a Type II error has greater real-world consequences. Explain your decision.

Part A

A large pharmaceutical company has a new drug to relieve the symptoms of rheumatoid arthritis, a condition that causes joint stiffness and pain, but it does have side-effects.

H_0 : The new drug is no different than a placebo in relieving symptoms.

H_A : The new drug is different than a placebo in relieving symptoms.

Part B

Municipal water authorities routinely sample the water supply to determine the level of lead in the water. Elevated lead levels can lead to severe developmental problems in children.

H_0 : The lead levels are at an acceptable level.

H_A : The lead levels exceed acceptable levels.

Part C

H_0 : The rate of COVID-19 infection on campus has not changed since last month.

H_A : The rate of COVID-19 infection on campus has increased since last month.

Question 2

A food safety inspector is called upon to investigate a restaurant with a few customer reports of poor sanitation practices. The food safety inspector uses a hypothesis testing framework to evaluate whether regulations are not being met. If he decides the restaurant is in gross violation, its license to serve food will be revoked.

Part A

Write the hypotheses in words.

Part B

What is a Type 1 Error in this context?

Part C

What is a Type 2 Error in this context?

Part D

Which error is more problematic for the restaurant owner? Why?

Part E

Which error is more problematic for the diners? Why?

Part F

As a diner, would you prefer that the food safety inspector requires strong evidence or very strong evidence of health concerns before revoking a restaurant's license? Explain your reasoning.