2. When a law firm represents a group of people in a class action lawsuit and wins that lawsuit, the firm receives a percentage of the group's monetary settlement. That settlement amount is based on the total number of people in the group—the larger the group and the larger the settlement, the more money the firm will receive.

A law firm is trying to decide whether to represent car owners in a class action lawsuit against the manufacturer of a certain make and model for a particular defect. If 5 percent or less of the cars of this make and model have the defect, the firm will not recover its expenses. Therefore, the firm will handle the lawsuit only if it is convinced that more than 5 percent of cars of this make and model have the defect. The firm plans to take a random sample of 1,000 people who bought this car and ask them if they experienced this defect in their cars.

(a) Define the parameter of interest and state the null and alternative hypotheses that the law firm should test.

population parameter

(b) In the context of this situation, describe Type I and Type II errors and describe the consequences of each of these for the law firm.

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a. $H_0: P \le .05$ P is the population proportion of cars that're defective

$H_A: P > .05$ of that make and model

you want ←

one

Definitions:

. Type I error: when the null hypothesis is true in reality, but you rejected it due to having a rare sample (that's in the tail of the distribution)

Type II error: when the alternative hypothesis in reality, but you failed to reject the null hypothesis due to having an unusual sample

b. Type I: In reality, the proportion of defective cars is less than .05. However, the statistician's sample is an outlier and leads them to reject the null. As a consequence, the law firm will take the case and lose money.

Type II: In reality, the proportion of defective cars is greater than .05. However, the statistician's sample leads them to fail to reject the null. As a consequence, the law firm doesn't take the case (they're led to believe that p≤.05) even though they could have recouped their money if they had taken the case.