



AP[®] Statistics 2003 Sample Student Responses

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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.

The parameter of interest: π = True proportion of defect cars of that model.

$$\text{Null} = H_0: \pi = .05$$

$$\text{Alternative} = H_a: \pi > .05$$

- (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.

The type I error would be rejecting the null hypothesis that the proportion of defect cars is 5 percent or less when it is actually true. The consequence of this error would be the law firm taking the case and not being able to recover the expenses, therefore losing money.

The type II error would be failing to reject the null hypothesis that the proportion of defect cars is 5 percent when it is false. The consequence would be the law firm not accepting the case in which they could have made money.

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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.

θ = the true population proportion of cars of this specific make and model that have the defect in question

$$H_0: \theta = .05$$

$$H_a: \theta > .05$$

- (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.

Type I error:

They reject that the proportion of cars that have the defect equals .05 and accept that the proportion is greater than .05, when really the true proportion of cars with the defect does equal .05.

If this happens then the Law firm takes the case and does not recover its expenses from the case. They lose money

Type II error:

They fail to reject that the proportion of cars that have the defect equals .05, when really the proportion of cars that have the defect is greater than .05.

If this happens the Law firm does not take the case, even though they could have recovered their expenses. They miss out on an opportunity to make money.

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