

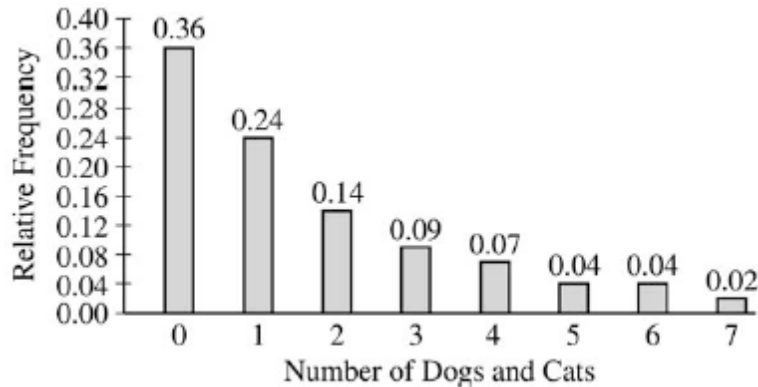


“FRAPPY”

{Free Response AP Problem...Yay! }

The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 15 minutes. You will be graded based on the AP rubric and will earn a score of 0-4. After grading, keep this problem in your binder for your AP Exam preparation.

The graph below displays the relative frequency distribution for X , the total number of dogs and cats owned per household, for the households in a large suburban area. For instance, 14 percent of the households own 2 of these pets.



Scoring:

(a) According to a local law, each household in this area is prohibited from owning more than 3 of these pets. If a household in this area is selected at random, what is the probability that the selected household will be in violation of this law? Show your work.

E P I

(b) If 10 households in this area are selected at random, what is the probability that exactly 2 of them will be in violation of this law? Show your work.

E P I

(c) The mean and standard deviation of X are 1.65 and 1.851, respectively. Suppose 150 households in this area are to be selected at random and \bar{X} , the mean number of dogs and cats per household, is to be computed. Describe the sampling distribution of \bar{X} , including its shape, center, and spread.

E P I

E P I

Total: __/4



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A company is considering implementing one of two quality control plans for monitoring the weights of automobile batteries that it manufactures. If the manufacturing process is working properly, the battery weights are approximately normally distributed with a specified mean and standard deviation.

Quality control plan A calls for rejecting a battery as defective if its weight falls more than 2 standard deviations below the specified mean.

Quality control plan B calls for rejecting a battery as defective if its weight falls more than 1.5 interquartile ranges below the lower quartile of the specified population.

Assume the manufacturing process is under control.

Scoring:

(a) What proportion of batteries will be rejected by plan A?

E I

(b) What is the probability that at least 1 of 2 randomly selected batteries will be rejected by plan A?

E I

(c) What proportion of batteries will be rejected by plan B?

E P I

Total: __/4



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A tire manufacturer designed a new tread pattern for its all-weather tires. Repeated tests were conducted on cars of approximately the same weight traveling at 60 miles per hour. The tests showed that the new tread pattern enables the cars to stop completely in an average distance of 125 feet with a standard deviation of 6.5 feet and that the stopping distances are approximately normally distributed.

Scoring:

(a) What is the 70th percentile of the distribution of stopping distances?

E P I

(b) What is the probability that at least 2 cars out of 5 randomly selected cars in the study will stop in a distance that is greater than the distance calculated in part (a)?

E P I

(c) What is the probability that a randomly selected sample of 5 cars in the study will have a mean stopping distance of at least 130 feet?

E P I

Total: __/4