

“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.

A local radio station plays 40 rock-and-roll songs during each 4-hour show. The program director at the station needs to know the total amount of airtime for the 40 songs so that time can also be programmed during the show for news and advertisements. The distribution of the lengths of rock-and-roll songs, in minutes, is roughly symmetric with a mean length of 3.9 minutes and a standard deviation of 1.1 minutes.

Scoring:

(a) Describe the sampling distribution of the sample mean song lengths for random samples of 40 rock-and-roll songs.

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(b) If the program manager schedules 80 minutes of news and advertisements for the 4-hour (240-minute) show, only 160 minutes are available for music. Approximately what is the probability that the total amount of time needed to play 40 randomly selected rock-and-roll songs exceeds the available airtime?

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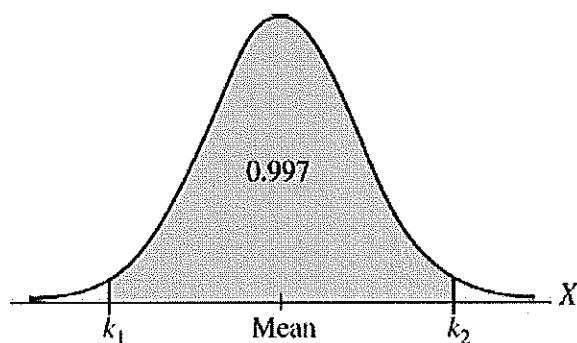
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2016 AP Statistics Test – Problem 5

5. A city council is considering funding a proposal to create a new city park. The council members will fund the proposal if they conclude that more than 60 percent of the city residents support the proposal. A survey of 2,000 randomly selected city residents will be conducted to investigate the level of support for the proposal. Let X represent the number of city residents in the sample who support the proposal. Assume that X is a binomial random variable.

- (a) Determine the mean and the standard deviation of the random variable X , assuming that 60 percent of city residents support the proposal.

The figure below shows a normal distribution that can be used to approximate the binomial probability distribution of X . The shaded region is bounded by k_1 and k_2 on the figure and represents the middle 0.997 of the area under the curve.



- (b) Assume that 60 percent of the city residents support the proposal. Use a normal approximation and the mean and standard deviation from part (a) to determine the values of k_1 and k_2 .

$$k_1 =$$

$$k_2 =$$

- (c) The survey was conducted, and 1,293 of the 2,000 city residents surveyed supported the proposal. Do your answers in part (b) and the survey results support the funding of the proposal? Justify your answer.