Use the following to answer the next two exercises: The cost of unleaded gasoline in the Bay Area once followed an unknown distribution with a mean of $4.59 and a standard deviation of $0.10. Sixteen gas stations from the Bay Area are randomly chosen. We are interested in the average cost of gasoline for the 16 gas stations.

83. What's the approximate probability that the average price for 16 gas stations is over $4.69?
   a. almost zero
   b. 0.1587
   c. 0.0943
   d. unknown

84. Find the probability that the average price for 30 gas stations is less than $4.55.
   a. 0.6554
   b. 0.3446
   c. 0.0142
   d. 0.9858
   e. 0

85. Suppose in a local Kindergarten through 12^{th} grade (K - 12) school district, 53 percent of the population favor a charter school for grades K through five. A simple random sample of 300 is surveyed. Calculate following using the normal approximation to the binomial distribtion.
   a. Find the probability that less than 100 favor a charter school for grades K through 5.
   b. Find the probability that 170 or more favor a charter school for grades K through 5.
   c. Find the probability that no more than 140 favor a charter school for grades K through 5.
   d. Find the probability that there are fewer than 130 that favor a charter school for grades K through 5.
   e. Find the probability that exactly 150 favor a charter school for grades K through 5.

   If you have access to an appropriate calculator or computer software, try calculating these probabilities using the technology.

86. Four friends, Janice, Barbara, Kathy and Roberta, decided to carpool together to get to school. Each day the driver would be chosen by randomly selecting one of the four names. They carpool to school for 96 days. Use the normal approximation to the binomial to calculate the following probabilities. Round the standard deviation to four decimal places.
   a. Find the probability that Janice is the driver at most 20 days.
   b. Find the probability that Roberta is the driver more than 16 days.
   c. Find the probability that Barbara drives exactly 24 of those 96 days.

87. $X \sim N(60, 9)$. Suppose that you form random samples of 25 from this distribution. Let $\overline{X}$ be the random variable of averages. Let ΣX be the random variable of sums. For parts c through f, sketch the graph, shade the region, label and scale the horizontal axis for $\overline{X}$, and find the probability.
   a. Sketch the distributions of X and $\overline{X}$ on the same graph.
   b. $\overline{X} \sim$ _____(_____,_____)
   c. $P(\overline{x} < 60) =$ _____
   d. Find the 30^{th} percentile for the mean.
   e. $P(56 < \overline{x} < 62) =$ _____
   f. $P(18 < \overline{x} < 58) =$ _____
   g. $\Sigma x \sim$ _____(_____,_____)
   h. Find the minimum value for the upper quartile for the sum.
   i. $P(1{,}400 < \Sigma x < 1{,}550) =$ _____

88. Suppose that the length of research papers is uniformly distributed from ten to 25 pages. We survey a class in which 55 research papers were turned in to a professor. The 55 research papers are considered a random collection of all papers. We are interested in the average length of the research papers.
   a. In words, $X =$ _____
   b. $X \sim$ _____(_____,_____)
   c. $\mu_X =$ _____
   d. $\sigma_X =$ _____
   e. In words, $\overline{X} =$ _____