Unit 8 Assignment

1. The weight of adobe bricks used for construction is normally distributed with a mean of 5 pounds and a standard deviation of 0.2 pounds.

   (a) Can you calculate the probability that a randomly selected brick weighs less than 5.1 pounds? If so, do it. If not, explain why.
   (b) What is the probability that a random sample of 50 bricks has a mean weight between 4.97 and 5.04 pounds?
   (c) What is the probability that a random sample of 100 bricks has a total weight greater than 502 pounds?
   (d) Are the probabilities you calculated in (b) and (c) exact or approximate? Explain.

2. The amount spent by customers in an express lane at a supermarket follows some right-skewed distribution with mean $18.50 and standard deviation $14.25.

   (a) Can you calculate the probability that the next customer spends less than $25? If so, do it. If not, explain why.
   (b) What is the probability that the average amount spent by the next 35 customers is between $17 and $22?
   (c) What is the probability that the total amount spent by the next 50 customers exceeds $1,000?
   (d) Are the probabilities that you calculated in (b) and (c) exact or approximate? Explain.

3. The time X (in seconds) that it takes the cashier to serve a customer in the express lane follows an exponential distribution with parameter $\lambda = 0.0125$. (And so it follows that the mean and standard deviation of X are both equal to $1/\lambda = 80$ seconds.)

   (a) Can you calculate the probability that the cashier spends between 1 and 2 minutes with the next customer? If so, do it. If not, explain why.
   (b) What is the probability that the teller spends an average of over 90 seconds with the next 30 customers?
   (c) What is the probability that the teller serves the next 50 customers in under an hour? (Assume there is always a customer waiting in line, and that the time between customers is negligible.)
   (d) Are the probabilities you calculated in (b) and (c) exact or approximate? Explain.