Questions on lesson 1.1?

We will be having our concept mastery quiz shortly.

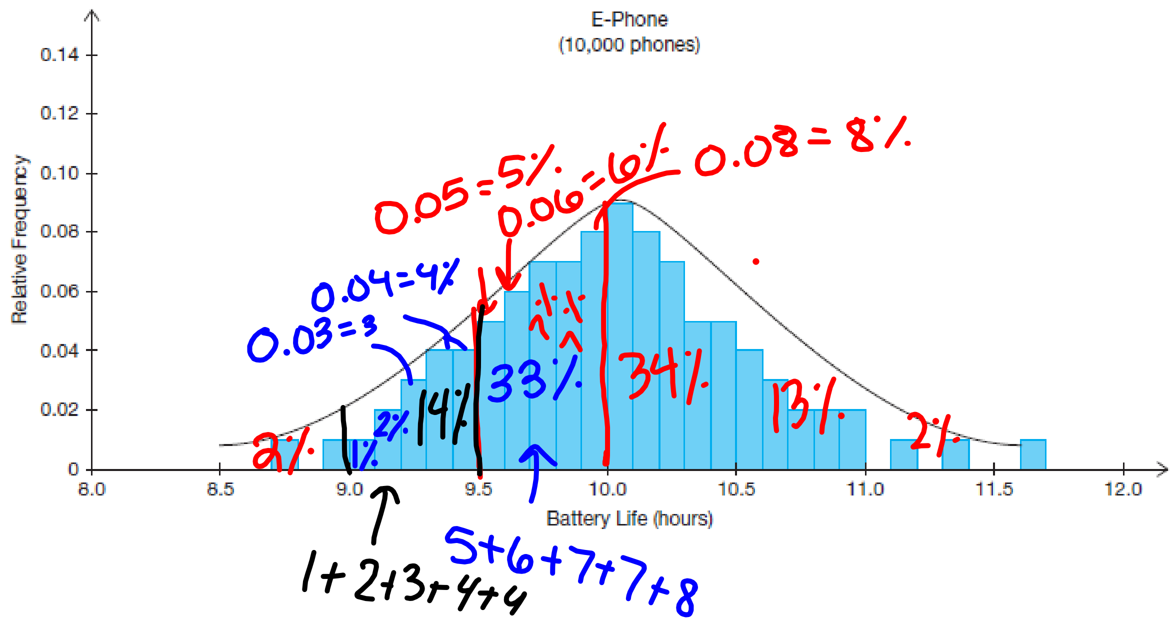
Content Mastery Quiz
1.1 day 2

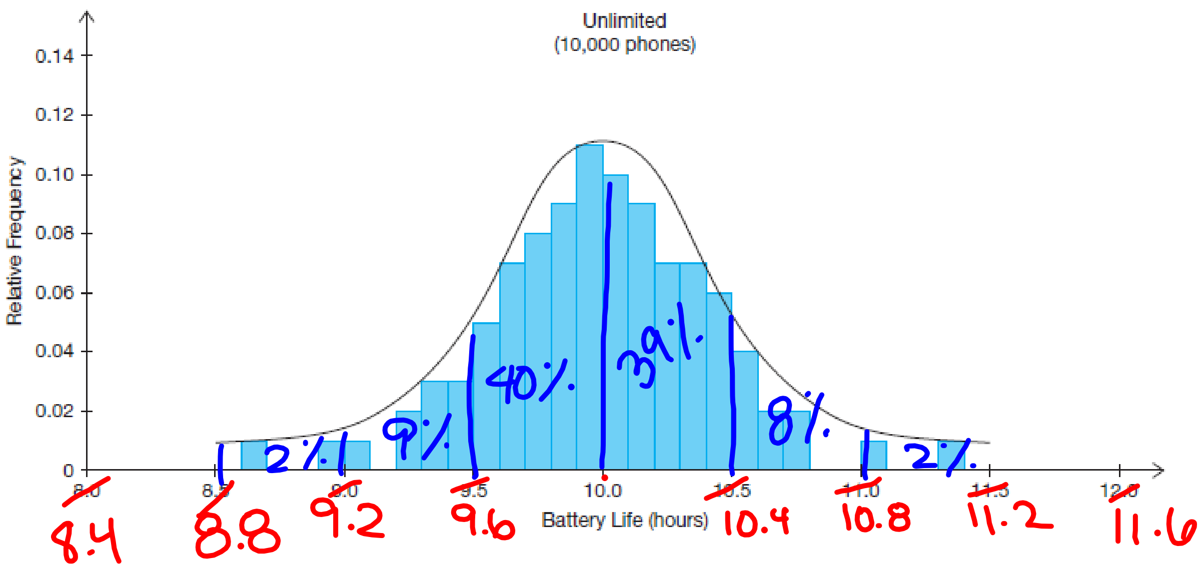
1.2 #I'mOnline

The Empirical Rule for Normal Distributions

Let's investigate what the standard deviation can tell us about a normal distribution.

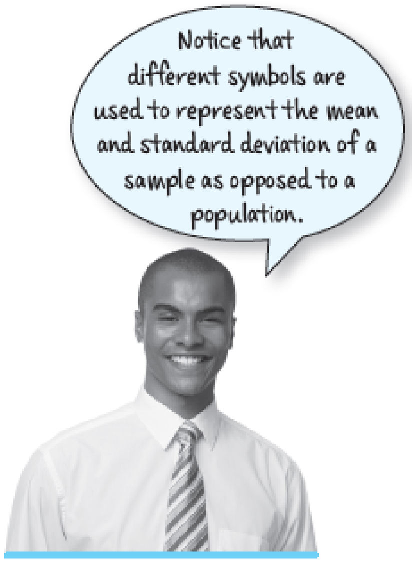
The relative frequency histograms for the battery lives of E-Phone and Unlimited cell phones are shown. The normal curves for each data set are mapped on top of the histogram.





PAGE 15 OF STUDENT TEXT

Normal curves can be graphed with units of standard deviation on the horizontal axis. The normal curve for the E-Phone sample has a standard deviation of 0.5 hour ($s = 0.5$), and the normal curve for the Unlimited sample has a standard deviation of 0.4 hour ($s = 0.4$). The mean of each sample is $\bar{x} = 10.0$ hours.

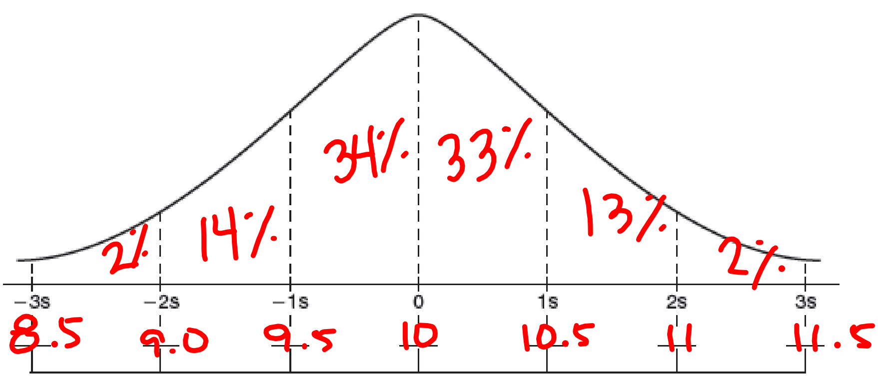


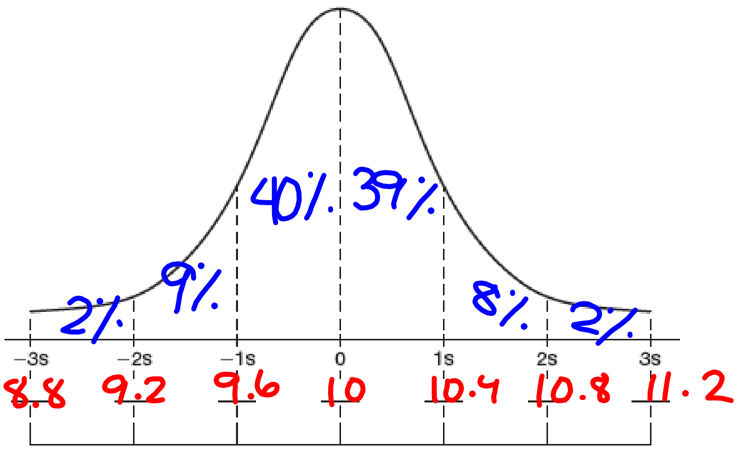
1. Study the graphs shown.
   a. For each graph, label each standard deviation unit with its corresponding battery life.
   b. What value is represented at $s = 0$ for both graphs?

   $\bar{x}$ or 10

2. Use the histograms on the previous page to estimate the percent of data within each standard deviation. Write each percent in the appropriate space below the horizontal axis.

E-Phone





YOU WORK ON #3-4 ON PG. 16

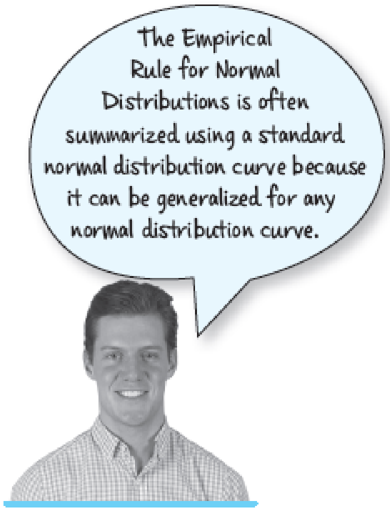
3. Compare the percents in each standard deviation interval for E-Phone with the percents in each standard deviation interval for Unlimited. What do you notice?

4. Use your results to answer each question. Explain your reasoning.
   a. Estimate the percent of data within 1 standard deviation of the mean.
   b. Estimate the percent of data within 2 standard deviations of the mean.
   c. Estimate the percent of data within 3 standard deviations of the mean.

Sep 1-8:17 AM

PAGE 17 IN BOOK

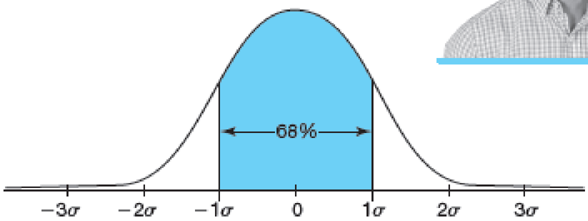
The standard normal distribution is a normal distribution with a mean value of 0 and a standard deviation of 1σ or $1s$. In a standard normal distribution, 0 represents the mean. Positive integers represent standard deviations greater than the mean. Negative integers represent standard deviations less than the mean.



The Empirical Rule for Normal Distributions states:

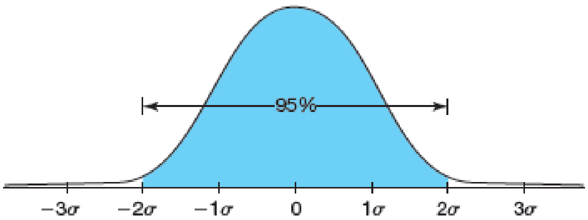
- Approximately 68% of the data in a normal distribution for a population is within 1 standard deviation of the mean.

$\mu \pm 1\sigma$



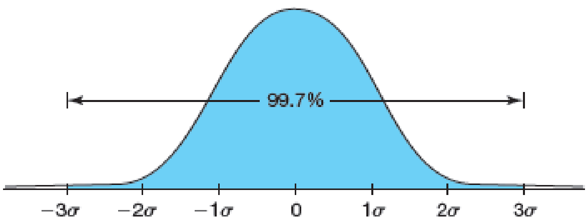
- Approximately 95% of the data in a normal distribution for a population is within 2 standard deviations of the mean.

$\mu \pm 2\sigma$



- Approximately 99.7% of the data in a normal distribution for a population is within 3 standard deviations of the mean.

$\mu \pm 3\sigma$



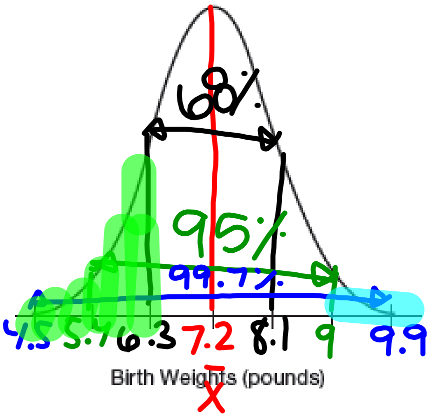
The Empirical Rule applies most accurately to population data rather than sample data. However, the Empirical Rule is often applied to data in large samples.

Aug 24-1:53 PM

NOT IN BOOK

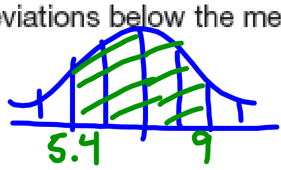
1. A researcher recorded the birth weights of a sample of newborn babies. The average birth weight was 7.2 pounds and the standard deviation was 0.9 pound. The birth weights follow a normal distribution.

   a. Label the number line so that the curve is a normal curve and follows the properties of the normal distribution. Include 3 standard deviations above and below the mean.



   b. Determine the percent of newborns that weigh between 2 standard deviations below the mean and 2 standard deviations above the mean.

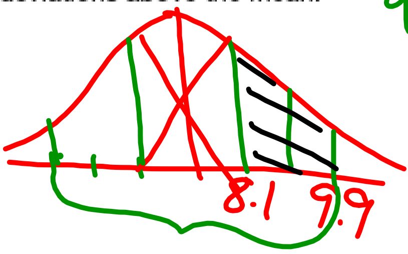
95%



   c. Determine the percent of newborns that weigh less than the mean.

50%

   d. Determine the percent of newborns that weigh between 1 standard deviation above the mean and 3 standard deviations above the mean.



$\frac{99.7-68}{2} = 15.85\%$

   e. Approximately what percent of newborns weighed between 4.5 pounds and 9.9 pounds?

99.7%

   f. Approximately what percent of newborns weighed more than 9 pounds?

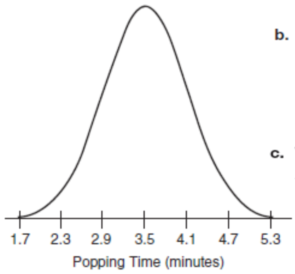
$\frac{100-95}{2} = 2.5\%$

   g. Approximately what percent of newborns weighed less than 6.3 pounds?

$\frac{100-68}{2} = 16\%$

NOT IN BOOK

2. The time to cook a bag of microwave popcorn is normally distributed with a mean of 3.5 minutes and a standard deviation of 0.6 minute.



b. What percent of microwave popcorn bags will properly cook in a timespan that is more than 3.5 minutes?

c. What percent of microwave popcorn bags will properly cook in a timespan that is less than 2.3 minutes?

Suppose that you randomly select a microwave popcorn bag from the sample. Use the given information and the distribution to answer each question. Explain your reasoning.

a. What percent of microwave popcorn bags will properly cook a timespan that is between 2.9 minutes and 4.1 minutes?

d. What percent of microwave popcorn bags will properly cook in a timespan that is more than 2.9 minutes?

e. What percent of microwave popcorn bags will properly cook in a timespan that is between 4.7 minutes and 5.3 minutes?

Individual Reflection

Homework

Finish lesson 1.2