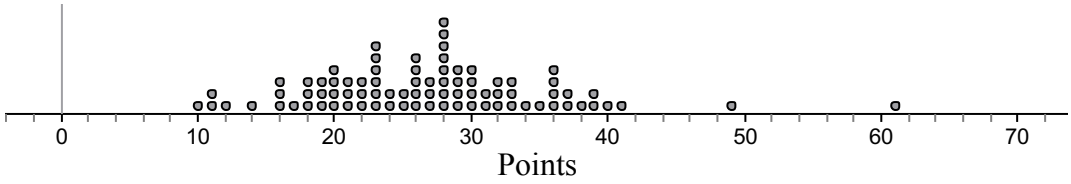
AP Statistics: 2.2 Normal Distributions

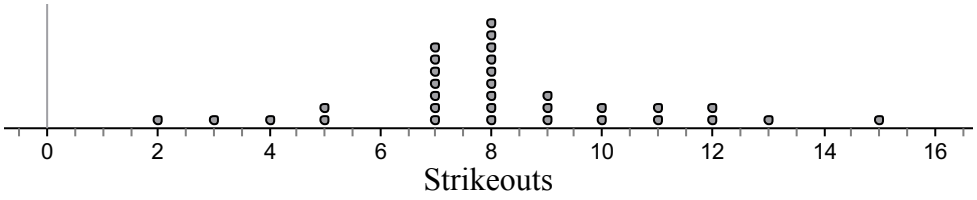
Read 110–111

According to the CDC, the heights of 12-year-old males are approximately Normally distributed with a mean of 149 cm and a standard deviation of 9 cm. Sketch this distribution, labeling the mean and the points one, two, and three standard deviations from the mean.

Here is a dotplot of Kobe Bryant's point totals for each of the 82 games in the 2008-2009 regular season. The mean of this distribution is 26.8 with a standard deviation of 8.6 points. In what percentage of games did he score within one standard deviation of his mean? Within two standard deviations?



Here is a dotplot of Tim Lincecum's strikeout totals for each of the 32 games he pitched in during the 2009 regular season. The mean of this distribution is 8.2 with a standard deviation of 2.8. In what percentage of games were his strikeouts within one standard deviation of his mean? Within two standard deviations?



Read 112–114

What is the 68-95-99.7 rule? When does it apply?

Do you need to know about Chebyshev's inequality? (However it is pretty cool.)

Using the earlier example, about what percentage of 12-year-old boys will be over 158 cm tall?

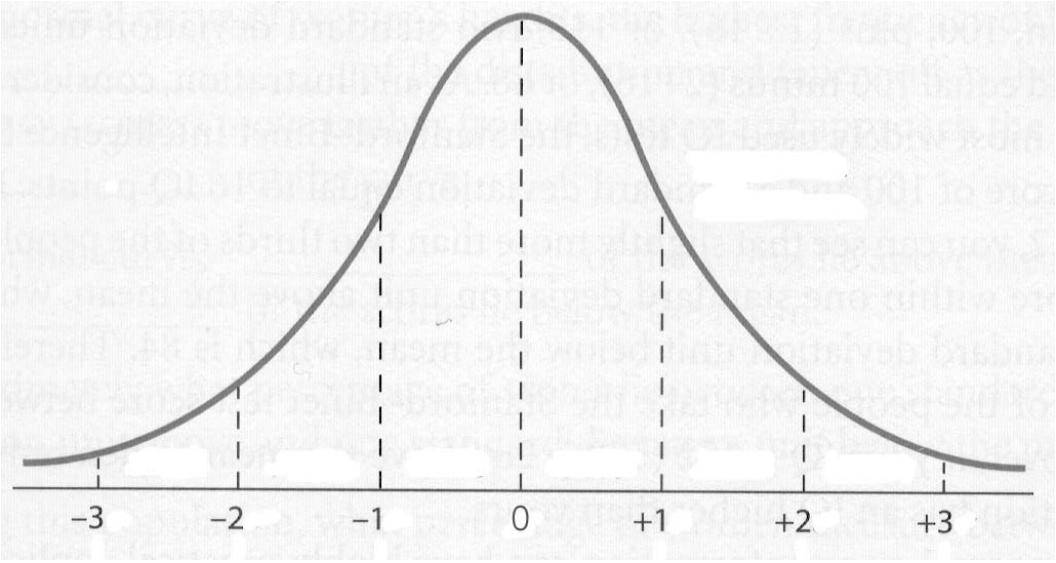
About what percentage of 12-year-old boys will be between 131 and 140 cm tall?

Suppose that a distribution of test scores is approximately Normal and the middle 95% of scores are between 72 and 84. What are the mean and standard of this distribution?

Can you calculate the percent of scores that are above 80? Explain.

HW: **page 109 (33–38), page 131 (41, 43, 45)**

NORMAL CURVE TO HELP YOU VISULIZE.



2.2 Normal Calculations continued.

Read 115

What is the standard Normal distribution?

Use the table to find the proportion of observations from the standard Normal distribution that are:

(a) less than 0.54

(b) greater than –1.12

(c) greater than 3.89

(d) between 0.49 and 1.82.

(e) within 1.5 standard deviations of the mean

A distribution of test scores is approximately Normal and Joe scores in the 85th percentile. How many standard deviations above the mean did he score?

In a Normal distribution, Q_1 is how many SD below the mean?

Alternate Example: Serving Speed

In the 2008 Wimbledon tennis tournament, Rafael Nadal averaged 115 miles per hour (mph) on his first serves. Assume that the distribution of his first serve speeds is Normal with a mean of 115 mph and a standard deviation of 6 mph.

(a) About what proportion of his first serves would you expect to exceed 120 mph?

Remind them to do the three steps on each problem (state distribution and identify values of interest, show work, answer the question)

(b) What percent of Rafael Nadal's first serves are between 100 and 110 mph?

(c) The fastest 30% of Nadal's first serves go at least what speed?

(d) What is the *IQR* for the distribution of Nadal's first serve speeds?

(e) A different player has a standard deviation of 8 mph on his first serves and 20% of his serves go less than 100 mph. If the distribution of his serve speeds is approximately Normal, what is his average first serve speed?

HW page 131 (47-53 odd, 56, 58, 59)

2.2: Using the Calculator for Normal Calculations

How do you do Normal calculations on the calculator? What do you need to show on the AP exam?

For AP Exam: Must show three steps: state distribution and identify values of interest, show work, answer.

Suppose that Zach Greinke of the Kansas City Royals throws his fastball with a mean velocity of 94 miles per hour (mph) and a standard deviation of 2 mph and that the distribution of his fastball speeds is can be modeled by a Normal distribution.

(a) About what proportion of his fastballs will travel over 100 mph?

(b) About what proportion of his fastballs will travel less than 90 mph?

(c) About what proportion of his fastballs will travel between 93 and 95 mph?

(d) What is the 30^{th} percentile of Greinke's distribution of fastball velocities?

(e) What fastball velocities would be considered low outliers for Zach Greinke?

(f) Suppose that a different pitcher's fastballs have a mean velocity of 92 mph and 40% of his fastballs go less than 90 mph. What is his standard deviation of his fastball velocities, assuming his distribution of velocities can be modeled by a Normal distribution?

According to CDC, the heights of 3 year old females are approximately Normally distributed with a mean of 94.5 cm and a standard deviation of 4 cm.

(a) What proportion of 3 year old females are taller than 100 cm?

(b) What proportion of 3 year old females are between 90 and 95 cm?

(c) 80% of 3 year old females are at least how tall?

(d) Suppose that the mean heights for 4 year old females is 102 cm and the third quartile is 105.5 cm. What is the standard deviation, assuming the distribution of heights is approximately Normal?

HW page 132 (54, 60, 68–76)

2.2 Assessing Normality

Read 124–125

The measurements listed below describe the useable capacity (in cubic feet) of a sample of 36 side-by-side refrigerators. (Source: *Consumer Reports*, May 2010) Are the data close to Normal?

12.9	13.7	14.1	14.2	14.5	14.5	14.6	14.7	15.1	15.2	15.3	15.3
15.3	15.3	15.5	15.6	15.6	15.8	16.0	16.0	16.2	16.2	16.3	16.4
16.5	16.6	16.6	16.6	16.8	17.0	17.0	17.2	17.4	17.4	17.9	18.4

Read 126–128

When looking at a Normal probability plot, how can we determine if a distribution is approximately Normal?

Sketch a Normal probability plot for a distribution that is strongly skewed to the left.