AP Stats
2.1 Part A HW Problems 5, 7, 9, 11, 13, 15 pages 105 - 107

Name Key
Date________________Hour_____

5. Growth charts We used an online growth chart to find percentiles for the height and weight of a 16-year-old girl who is 66 inches tall and weighs 118 pounds. According to the chart, this girl is at the 48th percentile for weight and the 78th percentile for height. Explain what these values mean in plain English.

The girl weighs more than or equal to 48% of the girls her age and is taller than or equal to in height of 78% of girls her age. Since she is taller than or equal too 78%, but only weighs more than or equal to 48% of girls her age, she is probably taller and skinnier than her peers.

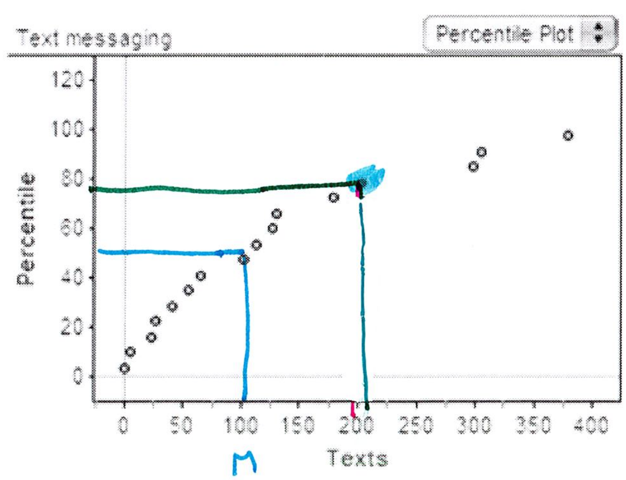
Exercise 7 involves a new type of graph called a percentile plot. Each point gives the value of the variable being measured and the corresponding percentile for one individual in the data set.

7. The percentile plot below shows the distribution of text messages sent and received in a two-day period by a random sample of 16 females from a large high school.

a) Describe the student represented by the highlighted point.

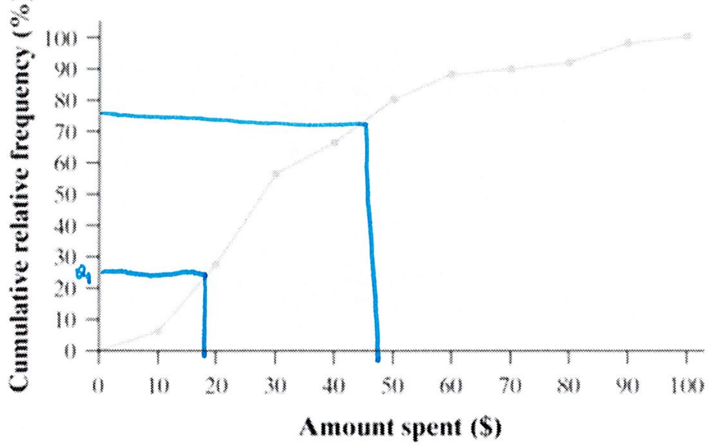
The highlighted student sent just over 200 texts (about 210) in a 2 day period, which places her around the 79th or 80th percentile.

b) Use the graph to estimate the median number of texts. Explain your method.



The median is the 50th percentile. Locate 50% on the y axis, read over to the points, and then find the relevant place on the x-axis. The median is around 100 texts.

9) Shopping spree The figure below is a cumulative relative frequency graph of the amount spent by 50 consecutive grocery shoppers at a store.



a) Estimate the interquartile range of this distribution. Show your method.

$Q_1 \approx 19$ $\qquad$ $IQR = \$49 - \$19 = \$30$

$Q_3 \approx 49$

b) What is the percentile for the shopper who spent $19.50?

About the 26th percentile

11) SAT versus ACT Eleanor scores 680 on the SAT Mathematics test. The distribution of SAT scores is symmetric and single-peaked, with mean 500 and standard deviation 100. Gerald takes the American College Testing (ACT) Mathematics test and scores 27. ACT scores also follow a symmetric, single-peaked distribution—but with mean 18 and standard deviation 6. Find the standardized scores for both students. Assuming that both tests measure the same kind of ability, who has the higher score?

Eleanor: $z_{680} = \frac{680-500}{100} = \frac{180}{100} = 1.8$ $\qquad$ Gerald: $z_{27} = \frac{27-18}{6} = \frac{9}{6} = 1.5$

Eleanor had a better score, since her standardized score was 1.8 while Gerald's standardized score was 1.5.

13) Measuring bone density Individuals with low bone density have a high risk of broken bones (fractures). Physicians who are concerned about low bone density (osteoporosis) in patients can refer them for specialized testing. Currently, the most common method for testing bone density is dual-energy X-ray absorptiometry (DEXA). A patient who undergoes a DEXA test usually gets bone density results in grams per square centimeter (g/cm2) and in standardized units.

Judy, who is 25 years old, has her bone density measured using DEXA. Her results indicate a bone density in the hip of 948 g/cm2 and a standardized score of z = −1.45. In the reference population of 25-year-old women like Judy, the mean bone density in the hip is 956 g/cm2.7

a) Judy has not taken a statistics class in a few years. Explain to her in simple language what the standardized score tells her about her bone density.

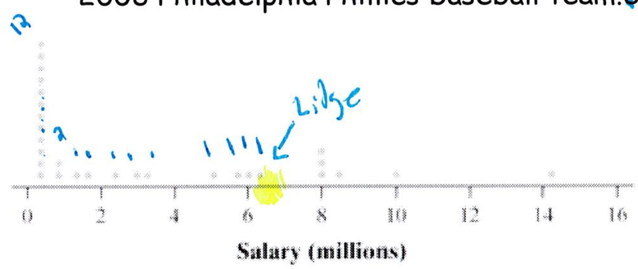
Judy's standardized score means her bone density is about one and a half standard deviations below the average score for all women her age.
Her bone density is below average compared to her peers.

b) Use the information provided to calculate the standard deviation of bone density in the reference population.

$Z = \frac{x-\mu}{\sigma}$ $\quad -1.45 = \frac{948-956}{\sigma}$ $\quad -1.45 = \frac{-8}{\sigma}$

$\boxed{\sigma = \frac{-8}{-1.45} \approx 5.52\ g/cm^2}$

Exercise 15 refers to the dotplot and summary statistics of salaries for players on the World Champion 2008 Philadelphia Phillies baseball team.8



Variable	n	Mean	Std. dev.	Min	Q_1	M	Q_3	Max
Salary	29	3388617	3767484	390000	440000	1400000	6000000	14250000

Baseball salaries Brad Lidge played a crucial role as the Phillies' "closer," pitching the end of many games throughout the season. Lidge's salary for the 2008 season was $6,350,000.

(a) Find the percentile corresponding to Lidge's salary. Explain what this value means.

23 salaries @ or below Lidge's $\quad \frac{23}{29} \approx .7931 = 79.31$ Percentile

Lidge's salary is greater than or equal to 79.31% of the 2008 Philadelphia Phillies baseball team.

(b) Find the *z*-score corresponding to Lidge's salary. Explain what this value means.

$$Z_{6,350,000} = \frac{6,350,000 - 3,388,617}{3,767,484} \approx .79$$

Lidge's salary was 0.79 standard deviations above the mean salary of $3,388,617.