

Name: Key

1. Draw a box and whisker plot for the following data set. List the 5 number summary and IQR.

88, 69, 58, 24, 66, 44, 52, 85, 93, 44, 66

24 44 44 52 58 66 66 69 85 88 93

Min: 24

Q1: 44

Median: 66

Q3: 85

Max: 93

IQR: 41

Mode: 44, 66



Find the value of the 40<sup>th</sup> percentile:

$(11)(40) = 4.4$  5<sup>th</sup> term 58

Are there any outliers?  $41(1.5) = 61.5$   
below 61.5  
above 146.5  
no outliers

2. You look at real estate ads for houses in Naples, Florida. There are many houses ranging from \$200,000 to \$500,000 in price. The few houses on the water, however, have prices up to \$15 million. The distribution of house prices will be

- A. skewed to the left.
- B. roughly symmetric.
- C. skewed to the right.
- D. unimodal.
- E. too high.

3. Suppose you wish to find out the percent of adults in your community that support building more nuclear power plants. Which sampling method is the **least likely** to have a bias?

- A. On a local radio program, invite listeners to call a phone number to express their opinions.
- B. Conduct a phone survey by calling every 50<sup>th</sup> number in a local phone book.
- C. Interview science teachers at your school.

4. Which survey question is likely to yield **unbiased** information?

- A. Knowing the efficiency of nuclear power, do you favor or oppose the construction of more nuclear reactors?
- B. Do you think nuclear power should be part of your country's energy mix?
- C. Knowing the potential dangers of nuclear power, do you favor or oppose the construction of more nuclear reactors?
- D. Do you favor or oppose the construction of more nuclear reactors?

5. A baseball team is reviewing their batting statistics. The mean number of hits for the batters on the team is 124, and the standard deviation is 14.5. What percent of the batters have between 95 and 124 hits?

$$\text{normal cdf}(95, 124, 124, 14.5) = 47.72\%$$

or

47.5% thinking of normal curve

6. The mean score on a quiz is 82 out of 100 possible points and the standard deviation is 4. Estimate the percent of scores that were 90 or higher.



$$\text{normal cdf}(90, 1000, 82, 4) = 2.3\%$$

or

2.5% thinking of normal curve

7. Identify the bias in the survey question, "Do you think the school day should be extended even longer than it already is?" Explain.

The bias is the implication that the school day is long.

8. Find the standard deviation for each sample data set. Use the standard deviation to compare each pair of data sets.

Times of boys in 100-m dash state high-school finals in 1998							
10.43	10.48	10.49	10.51	10.61	10.63	10.66	10.92

$$S_x = .156$$

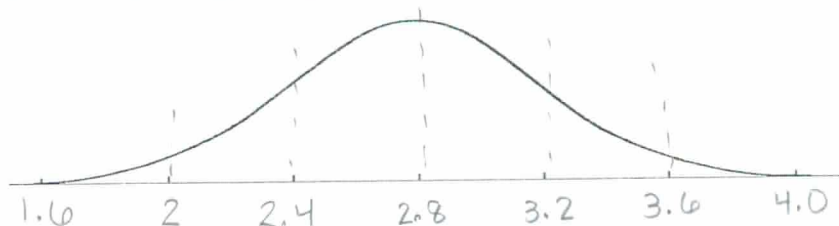
Times of boys in 100-m dash state high-school finals in 2008							
10.32	10.38	10.39	10.48	10.70	10.74	10.83	10.90

$$S_x = .226$$

Times in 1998 were more consistent

9. At a high school, GPA's are normally distributed with a mean of 2.8 and a standard deviation of 0.4.

- a. Label the normal distribution curve.



- b. About 95% of students at the high school will have a GPA between what 2 values?

2.0 and 3.6

- c. Approximately what percent of the data should fall within 2.4 and 3.2?

68%

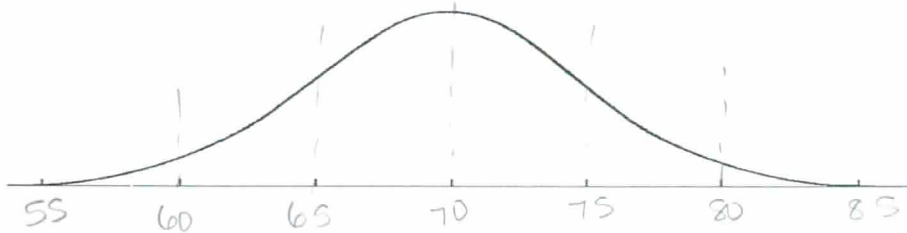
- d. What percent of students have a GPA of 3.0 or higher?

$$\text{normal cdf}(3.0, 1000, 2.8, .4) = 30.85\%$$

Identify the sampling method. Then identify any bias in each method.

10. A news reporter wants to determine what types of movies are most popular in her city. She surveys the first 20 people leaving a movie theater at 8:00PM on a Friday night. *convenience; only those at a particular theater*
11. A superintendent of schools selects 1 high school, 2 middle schools and 5 elementary schools from within the district and interviews all of the teachers at each of the schools. *cluster; may not be representative of all opinions*
12. Dr. McBride interviews 12 freshmen, 12 sophomores, 12 juniors and 12 seniors. *stratified*

13. 2000 freshmen at State University took a biology test. The scores were distributed normally with a mean of 70 and a standard deviation of 5. Label the mean and three standard deviations from the mean.



- a. What percentage of scores are between scores 65 and 75? *68%*
- b. What percentage of scores are between scores 60 and 70? *47.5%*
- c. What percentage of scores are between scores 60 and 85? *97.35%*
- d. What percentage of scores is less than a score of 55? *0.15%*
- e. What percentage of scores is greater than a score of 80? *2.5%*
- f. Approximately how many biology students scored between 60 and 70? *47.5% 950*
- g. Approximately how many biology students scored between 55 and 60? *2.35% 47*

14. Find the mean, median, mode and standard deviation for the following scenario.

Length (m)	12	13	14	15	16	17	18
Frequency	2	5	3	7	4	9	1

$\bar{x} = 15.19$   
 mean = 15  
 mode = 17

$\sigma_x = 1.69$

15. **Error Analysis** Using the data set {4, 2, 9, 8, 5, 5, 3, 9, 1, 1, 9, 3}, a student says the median is 4. Explain the student's error. What is the correct median?

16. Compare the following sets of data.

Great Lakes Coastal Water Temperatures (°F)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Buffalo, NY	34	28	33	46	56	65	72	70	61	50	44	38
Oswego, NY	49	48	48	49	52	57	62	65	64	62	58	54

Buffalo  
 $\bar{x} = 49.75$   
 $S_x = 15.05$   
 $\sigma_x = 14.41$

Oswego  
 $\bar{x} = 55.67$   
 $S_x = 6.51$   
 $\sigma_x = 6.24$

Temp in Oswego  
 is more consistent.

17. Find the area under the curve between two z-scores of -0.7 and 1.2.

normalcdf(-.7, 1.2, 0, 1)

64.3%

18. A set of data is modeled by a Normal distribution. The mean of this data set is 125 and the standard deviation is 25. Find the percent of data lower than 85.

normalcdf(-1E99, 85, 125, 25) = 5.48%

19. For each, sketch the standard normal distribution, shade the area described, and find the z-score cut-points.

a) The top 10% of the distribution.

invNorm(.9, 125, 25) = 157.04

$z = \frac{157.04 - 125}{25} = 1.28$

b) The lowest 40% of the distribution.

invNorm(.4, 125, 25) = 118.67

$z = \frac{118.67 - 125}{25} = -.25$

c) The middle 30% of the distribution.

invNorm(.35, 125, 25) = 115.37

$z = \frac{115.37 - 125}{25} = -.39$

$z = \frac{134.63 - 125}{25} = .39$

invNorm(.65, 125, 25) = 134.63

$z = -.39$

$z = .39$

$z = -.39$  to  $.39$

20. People with z-scores above 2.5 on an IQ test are sometimes classified as geniuses. If IQ scores have a mean of 100 and a standard deviation of 16 points, what IQ score do you need to be considered a genius?

$2.5 = \frac{x - 100}{16}$

$40 = x - 100$

$x = 140$  or higher