

## SM3H - Statistics Review

### Below the Line, Above the Line, and Between the Lines Z-Scores and Percentiles

1. The birth weights of African lions are normally distributed. The average birth weight of an African lion is 3.6 pounds with a standard deviation of 0.4 pound.
  - a. What percent of newborn African lions weigh less than 3 pounds?
  - b. What percent of newborn African lions weigh more than 3.8 pounds?
  - c. What percent of newborn African lions weigh between 2.7 and 3.7 pounds?
  - d. Determine the birth weight of a lion cub in the 80th percentile.
  - e. Determine the birth weight of a lion cub in the 10th percentile.
  - f. Determine the birth weight of a lion cub in the 97th percentile.
  - g. A lioness gives birth to 2 cubs. One cub is in the 47th percentile and 1 is in the 62nd percentile. Determine the difference in the cubs' weights.

### Sleep Tight

#### Using Confidence Intervals to Estimate Unknown Population Means

2. Five hundred teenage girls were surveyed about the number of hours they spend each week listening to music. The sample mean was 9.2 hours and the standard deviation was 2.7 hours.
  - a. Determine the standard deviation for the population mean.
  - b. Determine a 95% confidence interval for the population mean.

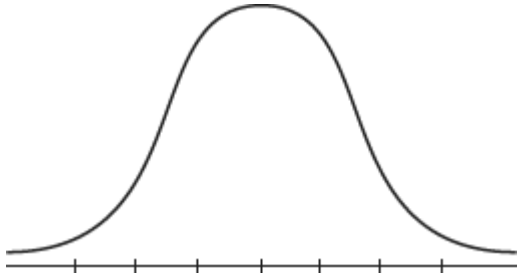
Sketch a relative frequency histogram for each distribution of sample data and determine if it is a normal or non-normal distribution.

3.

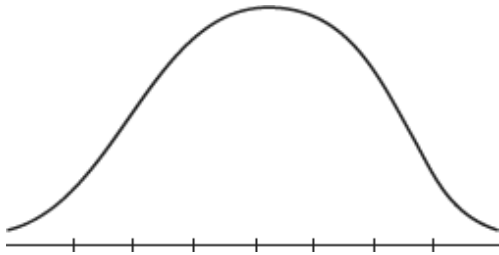
Math Exam Test Scores	Relative Frequency
50–60	0.10
60–70	0.22
70–80	0.42
80–90	0.18
90–100	0.08

Estimate the percent of data within the specified intervals of each normal distribution. Shade the corresponding region under the normal curve, label the tick marks on the horizontal axis, and label the horizontal axis. Use the Empirical Rule for Normal Distributions.

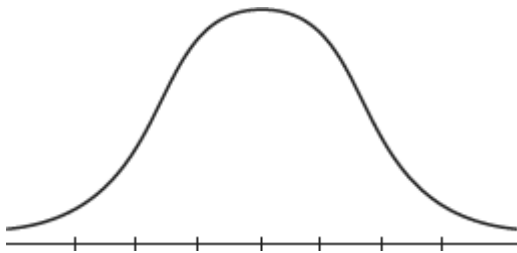
- Determine the percent of pregnancies with a duration between 253 and 283 days, given that the mean duration of a pregnancy is 268 days and the standard deviation is 15 days.



- Determine the percent of students who will get a grade between 80.9 and 86 on an upcoming math test, given that the professor's tests are normally distributed with a mean of 75.8 and a standard deviation of 5.1.



- Determine the percent of students who score between a 390 and 590 on the verbal section of a standardized test, given that the mean score is 490 and the standard deviation is 100.



### Problem Set

Calculate each percent using a  $z$ -score table. The weights of bags of chips are normally distributed with a mean of 31 grams and a standard deviation of 4 grams.

- The percent of bags that weigh more than 40 grams

Determine each percent using a graphing calculator. The systolic blood pressure for women is normally distributed with a mean of 120 mmHg and a standard deviation of 12mmHg.

- Determine the percent of women with a systolic blood pressure less than 120 mmHg.

Determine each percentile using a graphing calculator. The scores on the ACT test are normally distributed with a mean of 20.9 and a standard deviation of 4.8.

9. Determine the score that separates the top 75% of scores from the rest.

Classify each situation as a sample survey, an observational study, or an experiment. Explain your reasoning. If it is an experiment, identify the treatments.

10. A farmer wants to determine whether a nutritional supplement will have an effect on cows' milk production. For one week, he gives the supplement to half of his cows and then measures their milk output. Then, he compares the milk output of the cows that took the supplement with the milk output of the cows that did not get the supplement.

### Problem Set

Select a subjective sample of four items from each data set that best represents the mean of the data set. Explain your method for selecting the sample.

11. The weights (kilograms) of wildebeests in a zoo

130	242	227	186	250	192	215	203	232	175
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12. The number of crimes committed each month during a ten-month period

2	1	0	3	3	4	5	2	0	6
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Estimate each population mean using the data from the samples.

13. The heights in inches of people in an aerobics class  
70, 69, 65, 60, 62, 64, 73, 65, 66, 60, 66, 65

### Sleep Tight

#### Using Confidence Intervals to Estimate Unknown Population Means

#### Vocabulary

Write a definition for each term in your own words.

14. sampling distribution

### Problem Set

Determine whether each description represents a 68%, 95%, or 99.7% confidence interval. Explain your reasoning.

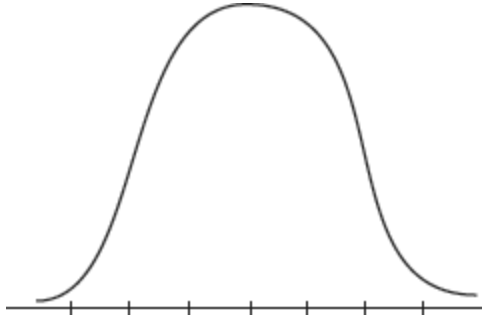
15. The confidence interval for a population mean is  $145.7 \pm 15.3$  and the standard deviation of the sampling distribution is 7.65.

16. The confidence interval for a population proportion is  $6\% \pm 0.2\%$  and the standard deviation of the sampling distribution is 0.002.

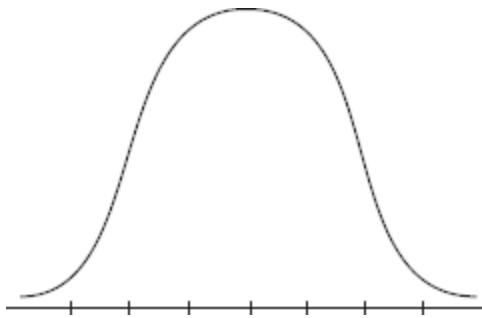
**Problem Set**

Label the horizontal axis of the normal curve using the sample proportion and standard deviation of the sampling distribution. Then, determine what sample proportions would be statistically significant.

17. A sample proportion of students who ate breakfast before coming to school is 0.53 and the standard deviation of the sampling distribution is 0.074.



18. A sample of adult drivers who are opposed to a red-light camera in the town is 0.85 and the standard deviation of the sampling distribution is 0.035.



Determine a range of values for the population mean using a 95% confidence interval. Explain your work.

19. A grocery store management team wants to study the employment duration of their workers. They take a sample of 38 cashiers from their stores and determine how long they have worked at the store. The sample mean was 2.3 years and the sample standard deviation was 1.5 years.

Identify and explain possible sources of bias in each situation.

20. A principal wants to know if students should be allowed to use cell phones while in the classroom. She surveys one math class to see how many students have cell phones and asks them how they could use their cell phones to improve instruction.
21. A principal wants to know if students should be allowed to use graphing calculators in the classroom. She surveys one English class and asks, "How do you use a graphing calculator to improve instruction?"

