

LESSON 8: EXERCISES

- 1) This frequency table describes the annual incomes of 35 workers in a company:

Income Class	Frequency
\$10,000-\$19,999	8
\$20,000-\$29,999	16
\$30,000-\$39,999	6
\$40,000-\$49,999	5

- a) Estimate the mean annual income of these 35 workers.
 - b) Why is the estimated mean closer to \$10,000 than to \$50,000?
- 2) Dum and Dee are twins who take the same classes at a college. Here are their grade reports for a term:

Dum's Grade Report			Dee's Grade Report		
Course	Number of Units	Grade	Course	Number of Units	Grade
Psychology	3	C	Psychology	3	D
Economics	4	B+	Economics	4	B
Math	6	A	Math	6	C-

- a) Find Dum's GPA for the term. Round off to two decimal places.
 - b) Find Dee's GPA for the term. Round off to two decimal places.
 - c) Give two reasons why Dee's GPA is so much lower than Dum's.
- 3) All exams in a class are graded out of 100 points. A student gets quiz grades of 65, 83, 80, and 90. The student gets a 92 on the Final. Find the student's weighted class average if the quizzes each count for 15% and the Final counts for 40% of the overall grade.
- 4) So far, your grade record in a class looks like this:

Exam	% of overall grade	Your score (out of 100 points)
Quiz 1	10%	55
Quiz 2	10%	50
Midterm 1	20%	65
Midterm 2	20%	40
Final	40%	c

What must you get on the Final to get at least 70% in the class overall?
(What kind of score do you need c to be?)

LESSON 9: EXERCISES

- 1) Notation: Population data.

- a) What does N stand for?
- b) What does μ stand for?
- c) What does σ stand for?
- d) What does σ^2 stand for?

- 2) Notation: Sample data.

- a) What does n stand for?
- b) What does \bar{x} stand for?
- c) What does s stand for?
- d) What does s^2 stand for?

- 3) What is really the purpose of finding s ?

- 4) The four students in a class take a test. Their scores in points are as follows:

72 80 91 85

- a) Find the **range** of the population data values.
- b) Use the formula $\mu = \frac{\sum x}{N}$ to find the **population mean**.
- c) Fill out the following table:

Data (x) values	Deviations ($x - \mu$) values	Squared Deviations ($(x - \mu)^2$ values)
72		
80		
91		
85		

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- d) What do the deviations from the mean add up to?

- e) Use the formula $\sigma^2 = \frac{\sum(x - \mu)^2}{N}$ to find the **population variance**.
The answer will be exact to one decimal place.

- f) Use the formula $\sigma = \sqrt{\frac{\sum(x - \mu)^2}{N}}$ to find the **population standard deviation**. Round it off to one decimal place.

- 5) 1000 students in a large lecture class take a test, and all the tests are graded. Four of the tests are randomly selected. Their scores in points are as follows:

64 85 71 72

- a) Find the **range** of the sample data values.

- b) Use the formula $\bar{x} = \frac{\sum x}{n}$ to find the **sample mean**.

- c) Fill out the following table:

Data (x) values	Deviations (x - \bar{x}) values	Squared Deviations (x - \bar{x})² values
64		
85		
71		
72		

- d) What do the deviations from the mean add up to?

- e) Use the formula $s^2 = \frac{\sum(x - \bar{x})^2}{n - 1}$ to find the **sample variance**.
Round it off to one decimal place, but avoid rounding when doing f) below.

- f) Use the formula $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$ to find the **sample standard deviation**.
Round it off to one decimal place.

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- 6) Assume that women's heights in Fredonia have a population mean of 65 inches and a population standard deviation of 5 inches.

- a) According to **Chebyshev's Theorem**, what proportion of women's heights in Fredonia are between 55 inches and 75 inches?
- b) According to **Chebyshev's Theorem**, what proportion of women's heights in Fredonia are between 50 inches and 80 inches?
- c) Let's assume that women's heights in Fredonia are approximately normally distributed. According to the **Empirical Rule**, what proportion of women's heights in Fredonia are between 60 inches and 70 inches?
- d) Let's assume that women's heights in Fredonia are approximately normally distributed. According to the **Empirical Rule**, what proportion of women's heights in Fredonia are between 55 inches and 75 inches?
- e) Let's assume that women's heights in Fredonia are approximately normally distributed. According to the **Empirical Rule**, what proportion of women's heights in Fredonia are between 50 inches and 80 inches?
- f) Use the "Two SD" (2σ) Rule for Usual Values to give an appropriate interval of usual heights for women in Fredonia.
- g) Based on f), would a 57-inch-tall Fredonian woman have an unusual height?
- h) Based on f), would a 77-inch-tall Fredonian woman have an unusual height?

- 7) Refer to Lesson 1, Example 1 on presidential ages. The population mean of presidential ages is 55.0 years, and the population standard deviation is about 6.5 years.

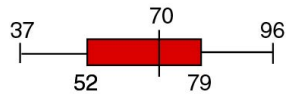
- a) Use the "Two SD" (2σ) Rule for Usual Values to give an appropriate interval of usual presidential ages.
- b) Based on a), would 40 years old be an unusual age for a president?
- c) Based on a), would 45 years old be an unusual age for a president?
- d) Based on a), would 65 years old be an unusual age for a president?
- e) Based on a), would 70 years old be an unusual age for a president?

LESSON 10: EXERCISES

1) Refer to Lesson 9, Exercise 7 on presidential ages. The population mean of presidential ages is 55.0 years, and the population standard deviation is about 6.5 years. Round off the z scores below to two decimal places.

- a) What would be the z score for a 40-year-old president?
Would that be unusual, based on the “Two SD” Rule?
- b) What would be the z score for a 45-year-old president?
Would that be unusual, based on the “Two SD” Rule?
- c) What would be the z score for a 65-year-old president?
Would that be unusual, based on the “Two SD” Rule?
- d) What would be the z score for a 70-year-old president?
Would that be unusual, based on the “Two SD” Rule?

2) The scores on a test (in points) in a large class are summarized by the boxplot (also known as a “box-and-whisker” plot) below. The minimum score is 37 points. The maximum score is 96 points. There are no extreme outliers.



- a) A score of 52 points is at which quartile?
- b) A score of 52 points is at which percentile?
- c) A score of 70 points is at which quartile?
- d) A score of 70 points is at which percentile?
- e) A score of 79 points is at which quartile?
- f) A score of 79 points is at which percentile?
- g) What is the median?
- h) What is the range?
- i) What is the IQR (Interquartile Range)?