HOMEWORK 2.1

Frequency Distributions and Their Graphs

Problem 1 A frequency distribution has the classes 10–19, 20–29, 30–39, 40–49, and 50–59.

a.) Find the class width. _____

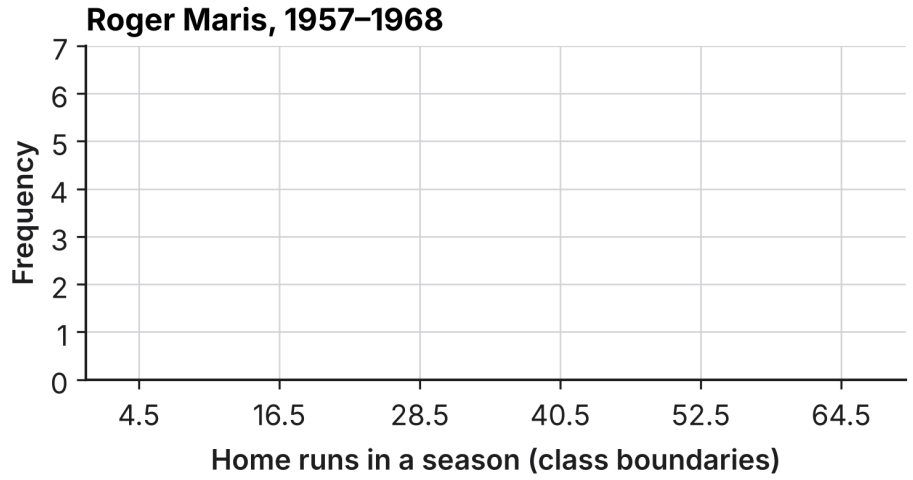
b.) Find the midpoint of each class. _____

c.) Find the class boundaries. _____

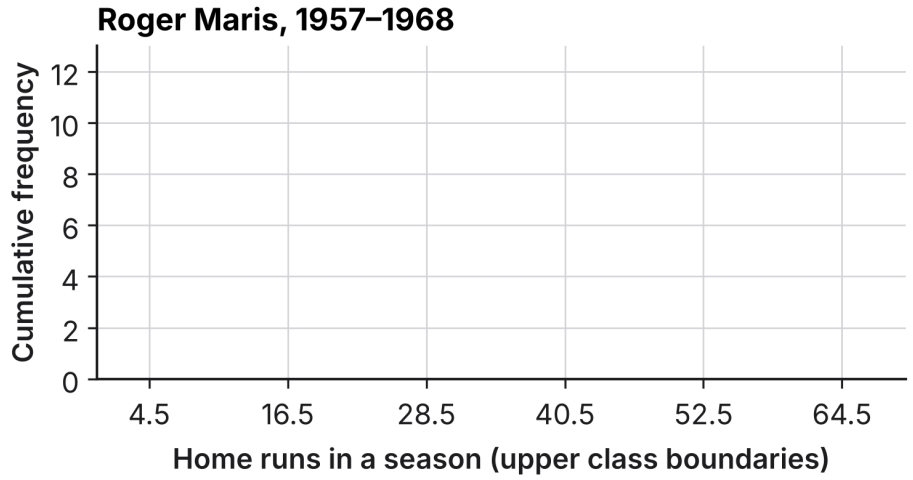
Problem 2 Roger Maris hit these home run totals from 1957 to 1968 (Baseball-Reference): 14, 28, 16, 39, 61, 33, 23, 26, 8, 13, 9, 5. Complete the frequency distribution using 5 classes. The first class is 5–16.

Class	Frequency, f	Midpoint	Relative frequency	Cumulative frequency
5–16				

Problem 3 Use your table from Problem 2 to draw a frequency histogram. Label the class boundaries on the horizontal axis.



Problem 4 Use your table from Problem 2 to draw an ogive.



Problem 5 Use your table and graphs to answer each question.

a.) Which class has the greatest frequency? _____

b.) In what percent of his seasons did Maris hit 28 or fewer home runs? _____

c.) Describe the shape of the histogram.

Problem 6 What is the midpoint of the class 40–49?

(A) 40
(B) 44.5
(C) 45
(D) 49.5

Problem 7 A relative frequency histogram has a bar of height 0.30 over the class 20–29. The data set has 40 entries. How many entries are in the class 20–29?

Problem 8 A data set has a minimum of 12 and a maximum of 87. You want 6 classes.

a.) Find the class width. _____

b.) List the lower class limits. _____

Problem 9 Which graph plots cumulative frequencies at the upper class boundaries?

(A) frequency histogram
(B) frequency polygon
(C) ogive
(D) relative frequency histogram

HOMEWORK 2.2

More Graphs and Displays

Problem 1 Aaron Judge hit these home run totals from 2017 to 2025 (Baseball-Reference): 52, 27, 27, 9, 39, 62, 37, 58, 53. Complete the stem-and-leaf plot.

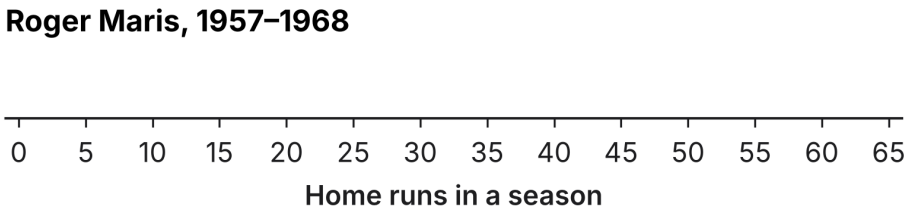
Stem	Leaves
0	
1	
2	
3	
4	
5	
6	

Key: 5 | 2 = 52 home runs

a.) On which stem do the most leaves fall? _____

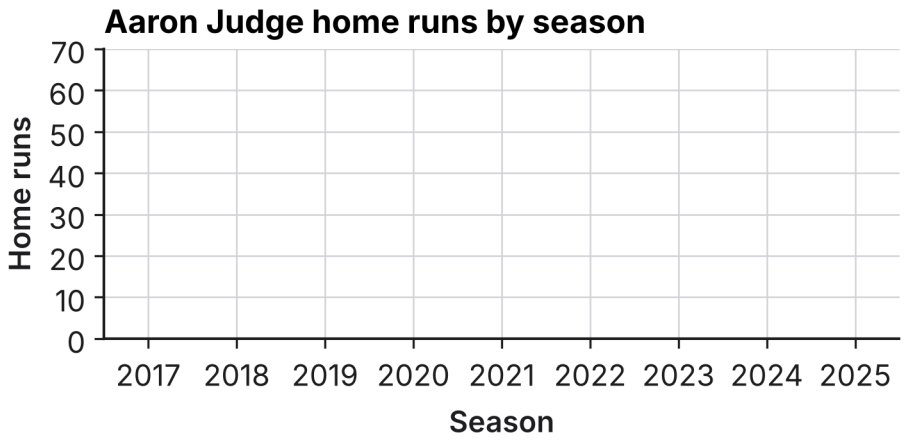
b.) Why do stems 1 and 4 have no leaves? _____

Problem 2 Make a dot plot of Roger Maris's home runs, 1957–1968: 14, 28, 16, 39, 61, 33, 23, 26, 8, 13, 9, 5.



Which data entry stands out from the rest? _____

Problem 3 Make a time series chart of Judge's home runs, 2017–2025.



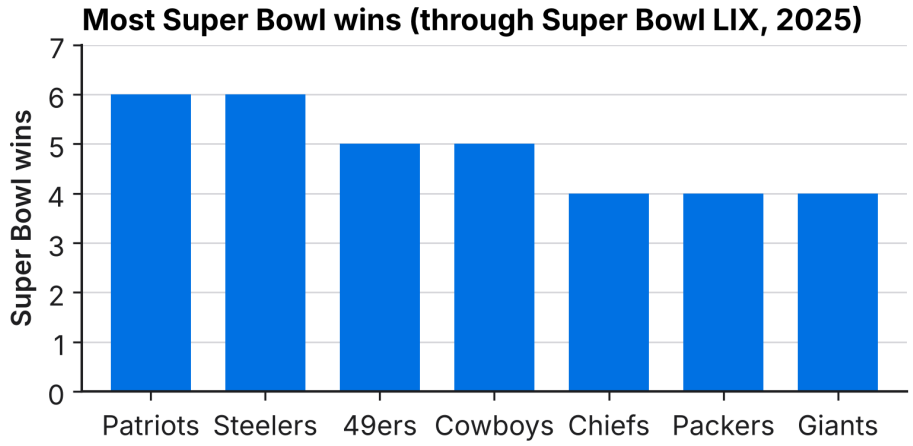
Which season is lowest? What might explain it? _____

Problem 4 A survey asked 50 students to name their favorite sport to watch. The results are below. Find the relative frequency and the central angle of each sector of a pie chart.

Sport	Frequency	Relative frequency	Angle
Football	22		
Basketball	15		
Baseball	9		
Other	4		

Which sport would be the first bar in a Pareto chart? Why? _____

Problem 5 Use the Pareto chart of Super Bowl wins from the notes (through Super Bowl LIX, 2025).



a.) How many more Super Bowls have the Steelers won than the Chiefs? _____

b.) What fraction of these seven teams' 34 wins belong to the 49ers and Cowboys together? _____

Problem 6 Which display shows a relationship between two quantitative variables, such as games played and home runs?

(A) pie chart
(B) scatter plot
(C) Pareto chart
(D) dot plot

Problem 7 Which display keeps every original data entry?

(A) histogram
(B) pie chart
(C) stem-and-leaf plot
(D) ogive

HOMEWORK 2.3

Measures of Central Tendency

Problem 1 Find the mean, median, and mode of Aaron Judge's home runs, 2017–2025: 52, 27, 27, 9, 39, 62, 37, 58, 53.

a.) Mean _____

b.) Median _____

c.) Mode _____

Problem 2 The scores on a short quiz are 6, 7, 7, 8, 9, 9, 9, 10, 10, 10. Find the mean, median, and mode.

Mean _____ Median _____ Mode _____

Problem 3 Decide which measure of central tendency best describes each data set: mean, median, or mode. Explain.

a.) The favorite NFL team of each student in a class _____

b.) Home prices in a town where a few homes cost several million dollars _____

c.) The heights of the students in a class, with no outliers _____

Problem 4 A student takes 4 classes. Find the student's grade point average (GPA). Use A = 4, B = 3, C = 2.

Class	Grade	Credit hours
Statistics	A	4
English	B	3
History	C	3
Gym	A	1

GPA _____

Problem 5 Use the frequency distribution of Maris's home runs from Homework 2.1 to estimate his mean.

Midpoint, x	Frequency, f	x · f
10.5	6	
22.5	3	
34.5	2	
46.5	0	
58.5	1	
	n = 12	

Estimated mean _____

Problem 6 Describe the most likely shape of each distribution.

a.) mean 80, median 85 _____

b.) mean 50, median 50 _____

c.) mean 35,000, median 28,000 _____

Problem 7 Which measure of central tendency can be used for qualitative data?

(A) mean
(B) median

(C) mode
(D) weighted mean

Problem 8 One entry in a data set is changed from 40 to 400. Which measure changes the most?

(A) the mean
(B) the median
(C) the mode
(D) none of them

HOMEWORK 2.4

Measures of Variation

Problem 1 Aaron Judge hit 62, 37, 58, and 53 home runs from 2022 to 2025 (Baseball-Reference). Treat these 4 seasons as a population.

x	$x - \mu$	$(x - \mu)^2$
62		
37		
58		
53		
$\Sigma x = 210$		

a.) Range _____

b.) Mean _____

c.) Population variance _____

d.) Population standard deviation _____

Problem 2 Now treat Judge's 2022–2025 seasons from Problem 1 as a sample.

a.) Sample variance _____

b.) Sample standard deviation _____

Problem 3 Use a TI-84 and all 9 of Judge's seasons, 2017–2025: 52, 27, 27, 9, 39, 62, 37, 58, 53. Treat the data as a sample.

a.) $\bar{x} \approx$ _____ $s \approx$ _____

b.) Find the coefficient of variation. _____

c.) Ruth's CV was about 25.6%. Whose home run totals varied more, relative to the mean? Explain.

Problem 4 Suppose the weights of a group of NFL offensive linemen are bell-shaped with a mean of 315 pounds and a standard deviation of 15 pounds. Use the Empirical Rule.

a.) About what percent weigh between 300 and 330 pounds? _____

b.) About what percent weigh between 285 and 345 pounds? _____

c.) About what percent weigh between 315 and 345 pounds? _____

d.) About what percent weigh more than 345 pounds? _____

e.) In a group of 200 such linemen, about how many weigh between 300 and 330 pounds? _____

Problem 5 Use Chebyshev's Theorem with Judge's 2017–2025 data: $\bar{x} \approx 40.4$, $s \approx 17.4$.

a.) At least what percent of the data lie within 2 standard deviations of the mean? _____

b.) Find the interval within 2 standard deviations. _____

c.) What percent of Judge's 9 seasons actually lie in the interval? _____

d.) Why should you use Chebyshev's Theorem, not the Empirical Rule, for these data? _____

Problem 6 Two data sets each have a mean of 50. Set A has s = 4. Set B has s = 12. Which statement is true?

(A) Set A is more spread out.
(B) Set B is more spread out.
(C) The sets have the same spread.
(D) Set B has more entries.

Problem 7 For any data set, at least what percent of the entries lie within 3 standard deviations of the mean?

(A) 68%
(B) 75%
(C) 88.9%
(D) 99.7%

HOMEWORK 2.5

Measures of Position

Problem 1 Use Aaron Judge's home runs, 2017–2025, in order: 9, 27, 27, 37, 39, 52, 53, 58, 62.

9 27 27 37 39 52 53 58 62

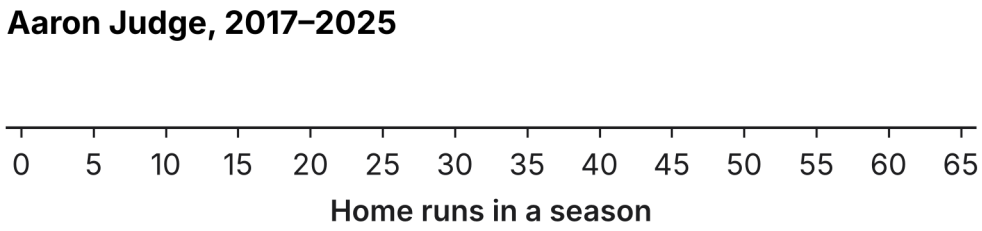
a.) Q_2 _____ Q_1 _____ Q_3 _____

b.) IQR _____

c.) Find the fences. Are there any outliers? _____

d.) Write the five-number summary. _____

Problem 2 Draw a box-and-whisker plot of Judge's home runs.



Compare Judge's box plot with Ruth's (five-number summary 22, 35, 46, 54, 60). Whose middle 50% is more spread out?

Problem 3 Find the percentile of Judge's 58 home runs (2024) among his 2017–2025 seasons. _____

Problem 4 Use Judge's sample statistics $\bar{x} \approx 40.44$ and $s \approx 17.42$.

a.) Find the z-score of his 62 home runs in 2022. _____

b.) Find the z-score of his 9 home runs in 2020. _____

c.) Are either of these seasons unusual? Explain.

d.) Maris's 61 had a z-score of 2.38. Whose record season stood out more from his own career, Judge's 62 or Maris's 61?

Problem 5 A student scores 85 on a statistics test with mean 75 and standard deviation 5. The same student scores 90 on a history test with mean 82 and standard deviation 8. On which test did the student do better compared with the class?

Problem 6 In a box-and-whisker plot, what does the vertical line inside the box show?

(A) the mean
(B) the median
(C) the mode
(D) the IQR

Problem 7 A data value has a z-score of –2.5. Which statement is true?

(A) It is 2.5 units below the mean.
(B) It is 2.5 standard deviations above the mean.
(C) It is 2.5 standard deviations below the mean, so it is unusual.
(D) It is at the 25th percentile.

Problem 8 The numbers of points a player scored in 10 games are 4, 6, 7, 7, 8, 9, 10, 10, 12, 25.

4 6 7 7 8 9 10 10 12 25

a.) Q_1 _____ Q_3 _____ IQR _____

b.) Is 25 an outlier? Explain. _____

c.) In a modified box plot, where does the right whisker end?

Test 1 Review: Descriptive Statistics

Part I · Multiple Choice

SECTION A · NO CALCULATOR

Choose the best answer. Explain your choice in a few words.

Problem 1 A data set has a mean of 64 and a median of 71. What is the most likely shape of its distribution?

(A) symmetric
(B) uniform
(C) skewed left
(D) skewed right

Problem 2 A data set is bell-shaped with a mean of 70 and a standard deviation of 6. About what percent of the data lie between 64 and 76?

(A) 34%
(B) 68%
(C) 95%
(D) 99.7%

Problem 3 Which z-score is **unusual**?

(A) –1.45
(B) 0.82
(C) 2.31
(D) 1.99

Problem 4 In a box-and-whisker plot, the box shows

(A) the middle 50% of the data
(B) the range
(C) the mean and standard deviation
(D) only the outliers

Problem 5 What is the midpoint of the class 20–29?

(A) 24
(B) 24.5
(C) 25
(D) 29.5

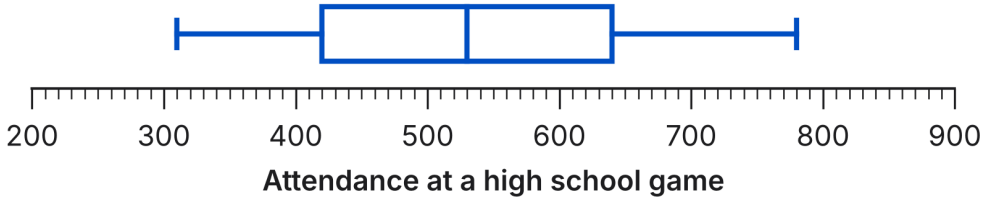
Problem 6 Which graph is best for showing how one team’s attendance changed from season to season?

(A) pie chart
(B) Pareto chart
(C) time series chart
(D) stem-and-leaf plot

Problem 7 Which measure of central tendency should you use for the favorite NFL team of each student in a class?

(A) mean
(B) median
(C) mode
(D) range

Use the box-and-whisker plot for Problems 8 and 9.



Attendance at a high school game

Problem 8 What is the interquartile range?

(A) 110
(B) 220
(C) 470
(D) 1060

Problem 9 About what percent of the data lie between the median and the maximum?

(A) 25%
(B) 50%
(C) 75%
(D) 100%

Problem 10 A student's score is at the 80th percentile. What does this mean?

(A) The student got 80% of the questions right.
(B) About 80% of the scores are at or below this score.
(C) About 80% of the scores are above this score.
(D) The score is 80 points.

Part I · Multiple Choice

SECTION B · CALCULATOR

Choose the best answer. Use your TI-84 where it helps.

Problem 11 A sample of test scores has a mean of 61.3, a median of 58, and a variance of 1854.76. What is the standard deviation?

(A) 927.38
(B) 43.07
(C) 21.53
(D) 7.83

Problem 12 A data set has a minimum of 12 and a maximum of 58. You want 6 classes. What class width should you use?

(A) 7
(B) 8
(C) 46
(D) 7.67

Problem 13 A team scored 21, 28, 14, 35, 17 points in five games. Treat the data as a sample. What is the sample standard deviation?

(A) 7.62
(B) 8.51
(C) 72.50
(D) 23.00

Problem 14 A test has a mean of 80 and a standard deviation of 6. What is the z-score of a score of 92?

(A) −2
(B) 2
(C) 12
(D) 0.5

Problem 15 A course grade is 40% tests, 30% homework, and 30% final exam. A student has a test average of 90, a homework average of 84, and a final exam score of 75. What is the course grade?

(A) 83.0
(B) 83.7
(C) 86.2
(D) 80.6

Part II · Free Response

SECTION A · CALCULATOR

Show all work. Round to one decimal place where needed.

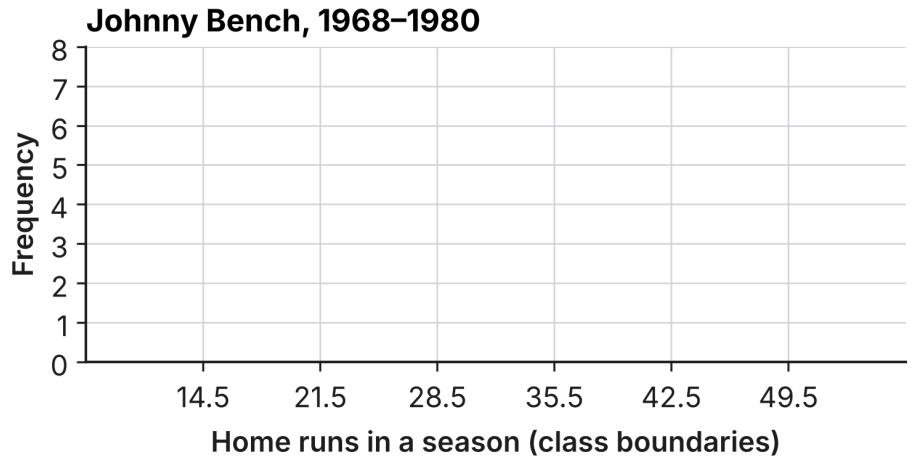
Problem 16 Johnny Bench hit these home run totals from 1968 to 1980 (Source: Baseball-Reference):

15, 26, 45, 27, 40, 25, 33, 28, 16, 31, 23, 22, 24

a.) Complete the frequency distribution. Use 5 classes. The first class is 15–21, and the class width is 7.

Class	Frequency, f	Midpoint	Relative frequency	Cumulative frequency
15–21				

b.) Draw a frequency histogram.



c.) Describe the shape of the distribution. _____

Problem 17 Use Johnny Bench's data from Problem 16. Treat the data as a sample.

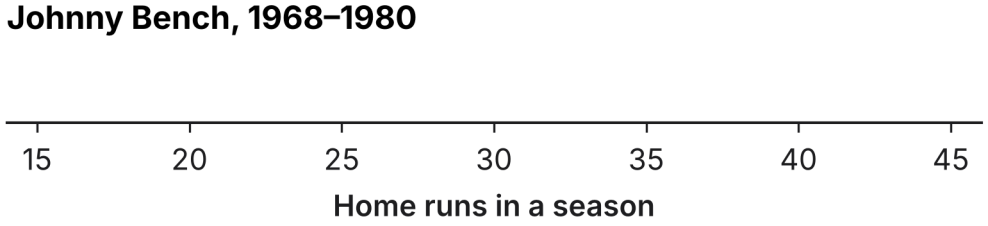
a.) Mean _____ Median _____ Mode _____

b.) Sample standard deviation _____

c.) Five-number summary _____ IQR _____

d.) Use the fences to decide whether there are any outliers. _____

e.) Draw a box-and-whisker plot.



f.) Johnny Bench hit 45 home runs in 1970, his first MVP season. Find the z-score. Is it unusual? _____

Part II · Free Response

SECTION B · NO CALCULATOR

Show all work.

Problem 18 A high school quarterback completed these numbers of passes in five games: 12, 15, 18, 21, 24. Complete the table, then find each value.

x	Deviation	Squared deviation
12		
15		
18		
21		
24		
$\Sigma x = 90$		

a.) Mean _____

b.) Sample variance _____

c.) Population variance, if the 5 games are the whole population _____

Problem 19 A basketball player made these numbers of 3-pointers in 12 games:

0 1 1 2 2 2 3 4 4 5 6 8

a.) Median _____ Mode _____ Range _____

b.) Q_1 _____ Q_3 _____ IQR _____

c.) Find the percentile of 5. _____

Problem 20 Suppose the heights of a group of basketball players are bell-shaped with a mean of 79 inches and a standard deviation of 3.5 inches.

a.) About what percent lie between 72 and 86 inches? _____

b.) About what percent lie above 82.5 inches? _____

c.) Find the z-score of 87.75 inches. Is it unusual? Explain. _____