

STA2023
Statistics Test 1 Review
Chapters 1-3

1. Identify the population and sample.

A survey of 898 U.S. adult VCR owners found that 16% had VCR clocks that were currently blinking "12:00."

Population: All U.S. adult VCR owners

Sample: 898 U.S. adults surveyed

2. Determine whether the numerical value describes a parameter or a statistic

According to USA Today, the median salary for Pittsburgh Steelers in the 2004 season was \$895,716.

parameter

In a survey of a sample of UNF students 75% say we need more options for food on campus.

Statistic

3. Determine which data are qualitative and which are quantitative.

Colors of the rainbow qualitative

Zip codes qualitative

Salaries of Baseball Players quantitative

GPA's of Students at FCCJ quantitative

4. Identify the data set's level of measurement (nominal, ordinal, interval or ratio)

Temperature interval

Amount of money in your bank account ratio

Top five colleges in US ordinal

Hair color nominal

5. Classify the Sampling method (Simple random sample, Stratified, Cluster, Convenience or Systematic)

A student survey's his friends for a class project. Convenience

A state trooper uses a radar gun to record the speed of every 5th car on the highway

Systematic

A school board selects all of the students in 5 of the ten schools in the district to participate in a study. Cluster

A teacher selects one student in each of the 5 groups to come to the board and do a problem.

Stratified

Amanda puts all of friend's names in a hat and selects one to go to the concert with her. Simple random sample

Using the frequency distribution, build an extended frequency distribution, draw a frequency histogram, a cumulative frequency graph and answer questions about the data.

6. Fill in the table.

Class	Frequency	Midpoint	Relative Frequency	Cumulative Frequency	Class Boundaries
79-93	9	86	$9/32 = .28$	9	78.5 - 93.5
94-108	12	101	$12/32 = .38$	21	93.5 - 108.5
109-123	5	116	$5/32 = .16$	26	108.5 - 123.5
124-138	3	131	$3/32 = .09$	29	123.5 - 138.5
139-153	2	146	$2/32 = .06$	31	138.5 - 153.5
154-168	1	161	$1/32 = .03$	32	153.5 - 168.5
	$\Sigma f = 32$		$\Sigma rf = 1$		

7. What percentage of the data is from 109-123?

$$\frac{5}{32} = .16$$

8. What percentage of the data is at most 108?

$$\frac{21}{32} = .66$$

9. What percentage of the data is at least 139?

$$\frac{3}{32} = .09$$

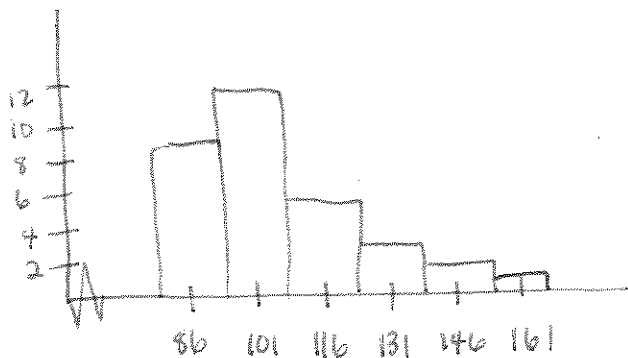
10. What percentage of the data is more than 153?

$$\frac{1}{32} = .03$$

11. What percentage of the data is less than 109?

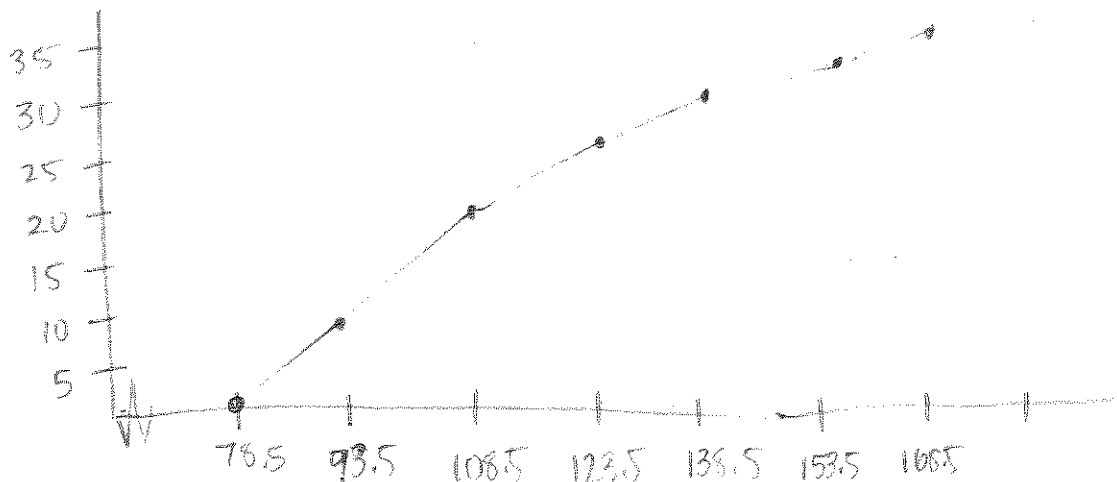
$$\frac{5}{32} = .16$$

12. Draw a Frequency Histogram



13. What is the shape of the distribution? Skewed Right

14. Draw a Cumulative frequency graph (ogive)



Use the frequency distribution to answer the questions.



15. Determine the number of classes. 15
16. Determine the frequency of the class or classes with the least frequency 2
17. Determine the frequency of the class with the greatest frequency 20
18. Determine the number in the sample 137
19. Determine the relative frequency for the fourth class $4/137 = .03$
20. Describe the shape of the data skewed left
21. The above histogram represents the number of labor hours worked by employees of X.Y.Z. Construction. The letters A, B, and C are marked on the horizontal axis. Determine mean, median, and mode.

Mean: A Median: B Mode: C
More impacted by outliers *Less impacted by outliers* *Highest Frequency*

Calculate the Mean, median, mode, variance, and standard deviation using the stem and leaf plot. Assuming the data is from a population write the appropriate symbols.

3	2	3	3	4	5	9						
4	0	1	1	3	4	5	5	6	6	7	8	
5	1	3	3	3								
6	0	0	6	9								

22. Write the original data set. 32, 33, 33, 34, 35, 39, 40, 41, 41, 43, 44, 45, 45, 46, 46, 47, 48, 51, 53, 53, 53, 60, 60, 66, 69
23. Mean: $46.28 = \mu$
24. Median: 45
25. Mode: 53
26. Variance: $97.81 = \sigma^2$
27. Standard deviation: $\sigma = 9.89$

Find the range, sample standard deviation and sample variance. You may use a calculator but if you don't have one use the chart below. Assume the data is from a sample and use the appropriate symbols.

x	x-mean	(x-mean) ²
6		
8		
7		
10		
13		
Sum=	Sum=	Sum=

28. Range: $13 - 6 = 7$
 29. Sample variance: $7.6729 = s^2$
 30. Sample standard deviation: $2.77 = s$

31. Here are scores on an English paper for all of the students in and English composition class. Find the mean, variance, and standard deviation. Use the appropriate symbol.

58	88	79	76	66	99
80	94	84	72	69	94
93	92	80	84	90	69
67	54	90	89	95	76
86	80	98	63	94	84

$\mu = 81.43$
 $\sigma = 12.02$
 $\sigma^2 = 144.4804$

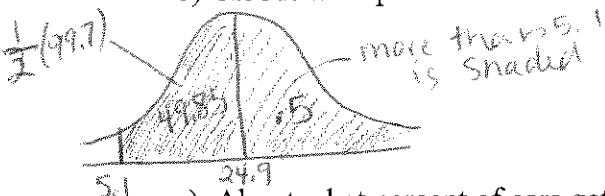
32. An environmental organization estimates for automobile models tested recently predicted a mean of 24.9 mpg and a standard deviation of 6.6 mpg for highway driving. Assume that the data is symmetric and bell-shaped. Use the Empirical Rule to answer the following questions:

a) In what interval would you expect 95% of the cars' mileage to be found? *Two standard deviations below & above*

2 above: $\mu + 2\sigma = 24.9 + 2(6.6) = 38.1$
 2 below: $\mu - 2\sigma = 24.9 - 2(6.6) = 11.7$

95% between 11.7 and 38.1

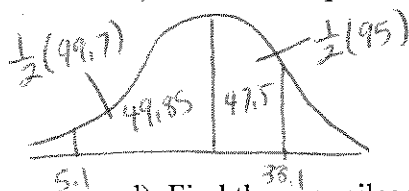
b) About what percent of cars should get more than 5.1 mpg? *Three std dev below the mean 99.7%*



$49.85\% + 50\% = 99.85\%$

99.85% get above 5.1 mpg

c) About what percent of cars get between 5.1 mpg and 38.1 mpg?

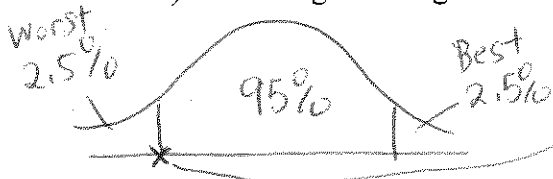


3 below 2 above

$49.85\% + 47.5\% = 97.35\%$

97.35% between 5.1 mpg and 38.1 mpg

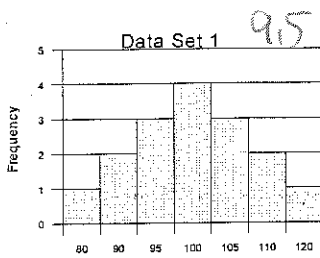
d) Find the gas mileage of the worst 2.5% of all cars.



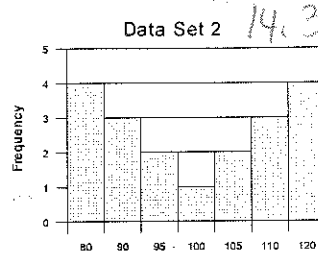
2st dev below = $\mu - 2\sigma = 24.9 - 2(6.6) = 11.7$

Below 11.7 mpg

33. Both data sets represented have a mean of 100. One has a standard deviation of 9.5, and the other has a standard deviation of 14.3. Which is which? Explain your reasoning.



Data ^x bunched close



Data ^x spread out

34. Suppose you roll a standard six sided die. List the sample space.

{ 1, 2, 3, 4, 5, 6 }

35. List the outcomes in the event "Roll an even number"

{ 2, 4, 6 }

36. Is this event simple? no, more than one outcome

37. Find the probability of rolling an even number. $\frac{3}{6} = \frac{1}{2}$

38. Find the probability of selecting a king from a deck of cards $\frac{4}{52} = \frac{1}{13}$

39. Find the probability of not selecting a king from a deck of cards $1 - \frac{1}{13} = \frac{12}{13}$

40. Find the probability of rolling a 6 $\frac{1}{6}$

41. Find the probability of rolling a "6" given that an even number was rolled. $\frac{1}{3}$

42. Are the events "rolling a 6" and "rolling an even number" independent? no, since probability changes

	Gender		Total
	Male	Female	
Party ID			
Democrat	165	279	444
Independent	47	73	120
Republican	191	225	416
Total	403	577	980

Use the chart above to find the following probabilities.

43. Find the probability of selecting a democrat. $\frac{444}{980}$

44. Find the probability of selecting a democrat given that you have selected a female. $\frac{279}{577}$

45. Find the probability of not selecting a male. $1 - \frac{403}{980}$

46. Find the probability of selecting a democrat ^{or} of an independent $\frac{444}{980} + \frac{120}{980} = \frac{564}{980}$

47. Find the probability of selecting a republican or a female $\frac{416}{980} + \frac{577}{980} - \frac{225}{980} = \frac{768}{980}$

48. Two cards are selected from a standard deck of 52 playing cards. The first card is replaced before the second card is selected. Find the probability of selecting a diamond and then selecting a king.

$$\frac{13}{52} \cdot \frac{4}{52}$$

49. The probability that a person in the United States has type B+ blood is 9%. Five unrelated people in the United States are selected at random.

a) Find the probability that all five have type B+ blood. $.09 \cdot .09 \cdot .09 \cdot .09 \cdot .09$

b) Find the probability that none of the five have type B+ blood. $.91 \cdot .91 \cdot .91 \cdot .91 \cdot .91$

c) Find the probability that at least one of the five as type B+ blood. $1 - (.91 \cdot .91 \cdot .91 \cdot .91 \cdot .91)$

50. You select a card from a standard deck of 52 playing cards. Find the probability of that the card is a 7 or a diamond. Are these events mutually exclusive? $\frac{4}{52} + \frac{13}{52} = \frac{17}{52}$ Not mutually exclusive

51. You select a card from a standard deck of 52 playing cards. Find the probability that the card is a 7 or an ace. Are these events mutually exclusive? $\frac{4}{52} + \frac{4}{52} = \frac{8}{52}$ Yes mutually exclusive

52. Suppose a password consists of 3 letters.

a) How many passwords can be made? $26 \cdot 26 \cdot 26 = 17576$

b) What is the probability of guessing the correct password? $\frac{1}{17576}$

53. You want to select a four person committee out of a total of twelve people. How many ways are possible?

$${}_{12}C_4 = 495$$

54. You want to select a four person committee out of a total of twelve people. Each person selected for the committee will be assigned a job. (President, Vice President, Secretary, or Social Coordinator) How many ways are possible? ${}_{12}P_4 = 11880$

55. There is an urn containing 20 balls. 5 balls are red, 6 are white, and 9 are yellow.

a) Calculate the probability that a randomly selected ball is white.

$$\frac{6}{20} = \frac{3}{10}$$

b) Calculate the probability that a randomly selected ball is white or yellow.

$$\frac{6+9}{20} = \frac{15}{20} = \frac{3}{4}$$

c) Calculate the probability that a randomly selected ball is not white. (use the complement rule)

$$1 - \frac{6}{20} = \frac{14}{20} = \frac{7}{10}$$

56. A standard six-sided die is tossed.

a) Calculate the probability that an even number is rolled.

$$\frac{3}{6} = \frac{1}{2}$$

b) Calculate the probability that a number greater than four is rolled.

$$\frac{2}{6} = \frac{1}{3}$$

c) What is the probability for an even number given that a number greater than four has been rolled.

$$P(E | >4) = \frac{1}{2}$$

d) Are the events of "rolling an even number" and "rolling a number greater than four" independent. Explain

They are independent since $P(E) = P(E | >4)$

57. Of 20 students in a class 12 have brown hair. Two of the students are chosen at random.

a) Find the probability that both have brown hair.

$$\frac{12}{20} \cdot \frac{11}{19} = \frac{132}{380} = \frac{33}{95}$$

b) Find the probability that neither have brown hair.

$$\frac{8}{20} \cdot \frac{7}{19} = \frac{56}{380} = \frac{14}{95}$$

c) Find the probability that at least one has brown hair.

$$= 1 - \frac{14}{95} = \frac{81}{95}$$

d) Find the probability that the first one has brown hair and the second does not.

$$\frac{12}{20} \cdot \frac{8}{19} = \frac{96}{380} = \frac{24}{95}$$

e) Find the probability that exactly one has brown hair.

$$\frac{12}{20} \cdot \frac{8}{19} + \frac{8}{20} \cdot \frac{12}{19} = \frac{48}{95}$$

58. Suppose that $P(A) = .43$, $P(B) = .36$, and $P(A \text{ and } B) = .14$

a) Find $P(A \text{ or } B)$

$$P(A) + P(B) - P(A \text{ and } B) = .43 + .36 - .14 = .65$$

b) Are the events A and B mutually exclusive? Why or why not?

No since $P(A \text{ and } B) \neq 0$

c) Find $P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{.14}{.43} = .326$

d) Find $P(A|B) = \frac{P(A \text{ and } B)}{P(B)} = \frac{.14}{.36} = .389$

e) Are the events A and B independent? Why or why not?

No since the probability of $P(A)$ is different from $P(A|B)$

59. Find the number of ways that 9 toys can be divided between 4 children if the youngest is to receive 3 toys and each of the others 2 toys.

$$\frac{{}^9C_3} {\text{youngest}} \cdot \frac{{}^6C_2} {\text{child 2}} \cdot \frac{{}^4C_2} {\text{child 3}} \cdot \frac{{}^2C_2} {\text{child 4}} = 84 \cdot 15 \cdot 6 \cdot 1 = 7560$$

60. Suppose a password consists of 5 letters. How many passwords can be made? What is the probability of guessing the correct password?

$$\frac{26}{1^{\text{st}}} \cdot \frac{26}{2^{\text{nd}}} \cdot \frac{26}{3^{\text{rd}}} \cdot \frac{26}{4^{\text{th}}} \cdot \frac{26}{5^{\text{th}}} = 11881376$$

$$\frac{\text{Prob}}{1/11881376}$$

61. A license plate consists of 3 letters followed by 3 numbers. How many license plates are possible if the letters o and i are not used.

$$\frac{24}{L1} \cdot \frac{24}{L2} \cdot \frac{24}{L3} \cdot \frac{10}{\#1} \cdot \frac{10}{\#2} \cdot \frac{10}{\#3} = 13824000$$

62. You want to select a five person committee out of a total of twelve people. How many ways are possible?

$$12C_5 = 792$$

63. You have 10 men and 12 women. How many ways can you select 2 men and 3 women for a jury.

$$\frac{10C_2}{\text{men}} \cdot \frac{12C_3}{\text{women}} = 45 \cdot 220 = 9900$$

64. You have 13 players on your baseball team. You must choose 9 of them for your batting line up. How many ways can you choose the nine players from the total of thirteen for the batting line up?

$$13P_9 = 259459200$$