

Illowsky – Chapt. 1, 2, & 3

Larson – Chapt. 1, 2, & 3

77

Math 123 Exam 1

SHOW ALL WORK

Name \_\_\_\_\_

1. Suppose a survey of 1,435 American workers found that the mean commute distance was 13.7 miles. Identify the sample and the implied population in this problem.

Sample: 1,435 American workers

Population: All American workers

2. If a census of all American workers found that 82% drive to work, is the 82% in this question a parameter or a statistic? Explain.

Parameter: the data is taken for the population of all American workers

3. The following data gives the number of people who attended a movie for each of 26 showings. Build a frequency distribution table for this data, using 5 classes. Your table only must include the class limits and either midpoints or boundaries along with the frequencies.

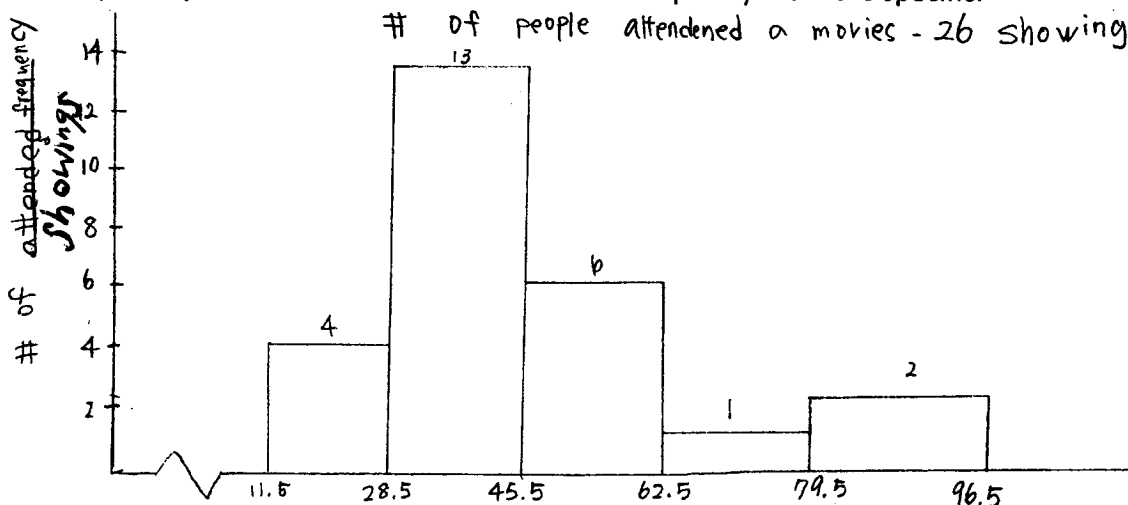
23 32 <sup>min</sup> 12 45 33 49 21 52 44 37 29 22 <sup>max</sup> 93  
 44 45 50 39 44 42 31 45 49 56 57 79 86 / 26

Class	class limits	boundaries	frequencies		
1	12 - 28	11.5 - 28.5	4	IF	4
2	29 - 45	28.5 - 45.5	13	IFIF	13
3	46 - 62	45.5 - 62.5	6	IF	6
4	63 - 79	62.5 - 79.5	1	-	1
5	80 - 96	79.5 - 96.5	2	T	2

$93 - 12 = 81 \div 5 = 16.2 \rightarrow 1$

4. Use your table from Problem 3 to make a frequency histogram. Be sure to label the graph appropriately. DO NOT label the vertical axis as frequency. Be more specific.

# of people attendened a movies - 26 showings.



5. The following stemplot gives the attendance at a random sample of 16 concerts. Identify the mode, discuss the shape of the distribution, and identify any outliers. Here is the key: 3/7 means 3700.

0/8  
1/24  
2/017  
3/12333  
4/005  
5/19  
6/8

$Q_1 - 1.5(IQR)$

$Q_3 + 1.5(IQR)$

$20.5 - 1.5(22) = -12.5$

$42.5 + 1.5(22) = 75.5$

Mode: 3300

Shape: symmetric

Outlier(s) No outlier

mean = 33

min = 8

$Q_1 = 20.5$

$Q_2$  (Med) = 33

$Q_3 = 42.5$

Max = 68

IQR = 22

6. Which "average" would be a better choice for the data in problem 5: the mean or the median? Explain.

mean = 33  
median = 33

} both of same number. It is does not matter which data use.

mean since no outliers and distribution is symmetric

7. Calculate the mean (to one decimal) and median (by hand). You must show work for credit.

4 6 15 10 7 5 / 6

4 5 6 7 10 15

$13 \div 2 = 6.5$

median 6.5

$4 + 5 + 6 + 7 + 10 + 15 = 47 \div 6 = 7.8$

mean 7.8

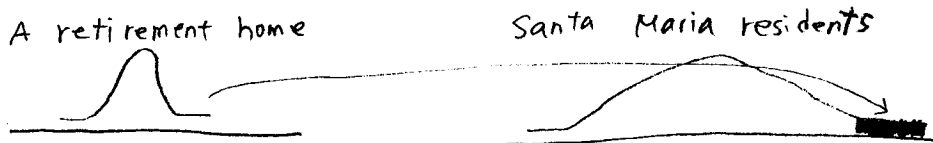
8. Calculate the sample standard deviation for the data in Problem 7. You MUST show your work (by making a table as shown in the text, for example) to get credit.

$x$	$x - \bar{x}$	$(x - \bar{x})^2$
4	-3.8	14.44
5	-2.8	7.84
6	-1.8	3.24
7	-0.8	0.64
10	2.2	4.84
15	7.2	51.84

standard deviation = 4.07021

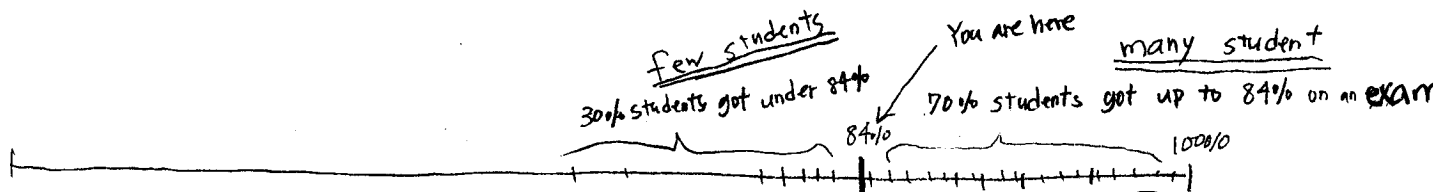
9. Members of two different groups were asked their ages: 10 residents at a retirement home and 10 residents of Santa Maria. Which group would you expect to have the higher *standard deviation* in their ages? Explain.

Santa Maria residents would have a larger standard deviation because sample will most likely not be similar in age, some might be closer, while a retirement home people are much older than Santa Maria residents. Most of the retirement home people are 60 to older.



10. Is it possible to score 84% on an exam and yet be in the 30<sup>th</sup> percentile? Explain VERY clearly, using the definition of percentile.

Yes The person got 84% on an exam, but most of the students (70<sup>th</sup> percent) got much more high score on the exam



11. Which of the following animals is heavier relative to other members of its species: a 650 lb. grizzly bear if the mean weight is 600 lbs. with standard deviation 50 pounds, or a 3.5 ounce rat if the mean weight is 3 oz. with standard deviation 0.8 oz. Explain, using z-scores.

See a paper.

12. How many meals are possible if you get to choose two side dishes, one main dish and one dessert if there are 13 side dishes, 10 main dishes and 6 desserts to choose from?

$$13C_2 \cdot 10C_1 \cdot 6C_1 = 78 \cdot 10 \cdot 6 = \boxed{4680}$$

red 100 C 55  $P(N) = \frac{55}{100}$  striped 100 C 40

13. There are 100 beads in a jar, 55 of which are red. Of those 100 beads, there are 40 that are striped. Of the 55 red beads, 15 are striped. You chose one bead at random from this jar.

What is the probability that the bead is not red?

$1 - .55 = .45$

$\frac{55}{100} \cdot \frac{40}{100} = 0.22$



What is the probability that the bead is red or striped?

$1 - 0.22 = 0.78$

$.55 + .40 - .15 = .8$

14. To win a lottery, you must correctly choose 6 numbers between 1 and 44. What is the probability of winning this lottery?

$\frac{6!}{1!44!} = \frac{720}{2,0582...} \approx 1.913955534 \times 10^{-5}$  many decimal

$\frac{1}{44 C 6}$

15. In a group of nine people, three are women and six are men. Two people are chosen at random from this group, without replacement. Answer the following:

Are the events "first person is a woman" and "second person is a woman" independent? Explain.

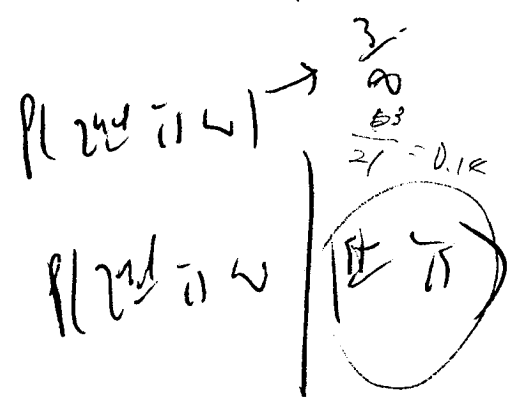
$P(1^{st} | w) = \frac{3}{9} = \frac{1}{3}$       $P(2^{nd} | w) = \frac{3}{9} = \frac{1}{3}$

M	F	total
6	3	9

~~independent~~  $\leftarrow P(1^{st} | w) \neq P(2^{nd} | w)$

Find the probability that both people are women.

$\frac{3C2}{9C2} = \frac{3}{36} = 0.08333$



Find the probability that neither person is a woman.

$\frac{6C2}{9C2} = \frac{15}{36} = 0.41666$   $\boxed{0.417}$

Find the probability that at least one of the two people is a woman.

$1 - 0.417 = 0.58333$

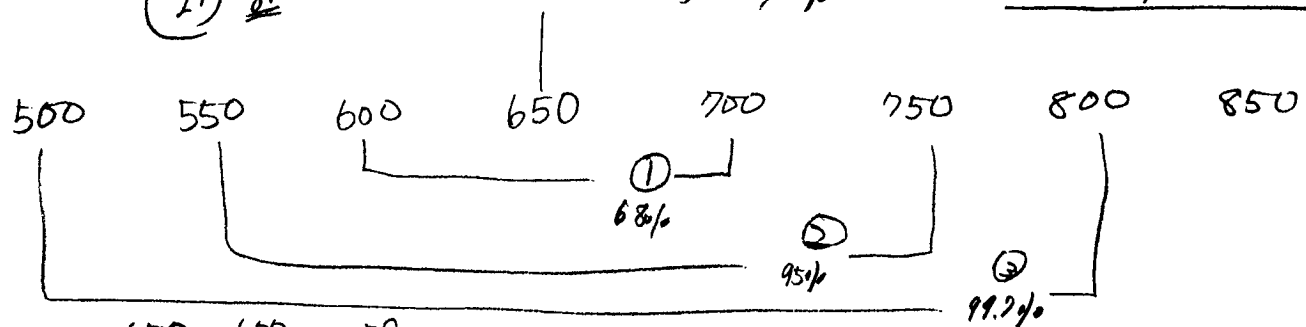
$\frac{2}{8}$

#11

(27) ~~27~~

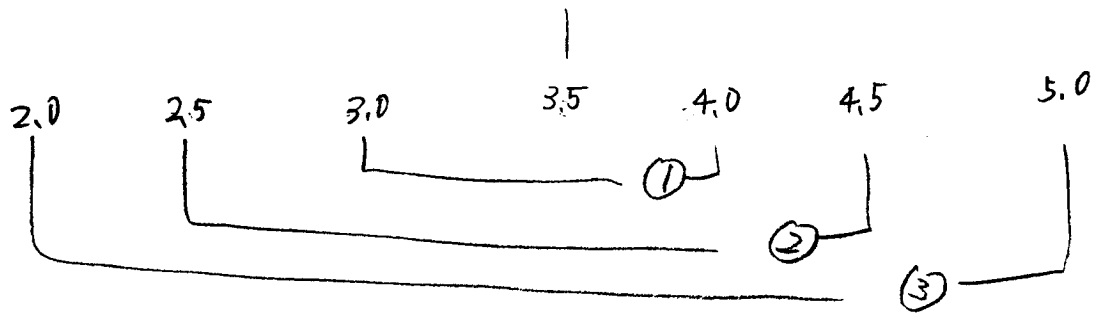
~~50~~ 450/700

Grizzly bear



$$z = \frac{650 - 600}{50} = \frac{50}{50} = 1$$

rat



$$z = \frac{3.5 - 3.0}{0.5} = \frac{0.5}{0.5} = 1$$

Both of them standard deviation is 1.

same result.