

DISCUSSION SECTION NUMBER TO WHICH EXAM WILL BE RETURNED _____

STATISTICS 2023

NAME, IN PRINT Key

EXAM ONE

SIGNATURE, IN INK _____

FALL 1998

SS # or OSU ID, IN INK _____

WHEN THIS EXAM IS RETURNED TO YOU RETAIN IT AS GRADE VERIFICATION

TRUE OR FALSE. Answer with a capital T or F

(3 points each)

F 1. Frequency tells the proportion of data in a certain category.

T 2. If the mean of a data set is less than the median and the median is less than the mode of the data set then the distribution is left skewed.

F 3. If a data set is assumed to be mound-shaped then approximately 5% of the data set would lie outside of the interval of values which are within one standard deviation of the mean.

T 4. The third quartile of a data set is a value that 75% of the data are less than and 25% of the data are more than.

T 5. If the z-score is 2.2 for an individual data value from a population with mean of 24 and variance of 16 then the individual data value is equal to 32.8.

T 6. Sample data can be described with graphical techniques and with numerical measures.

F 7. If two events are mutually exclusive they must also be independent.

T 8. If one fair die is rolled the probability that the number on the die face is at least 3 is $\frac{4}{6}$.

F 9. The mean of a population and the mean of a sample drawn from that population will always have the same value.

F 10. The standard deviation tells the typical difference between the mean and the median.

F 11. The sum of the probabilities of all of the simple events contained in the sample space must be equal to 0.5

STATE THE ANSWER. State the answer on the line given.

(3 points each)

884 12. If there are 3400 observations in a data set how many observations are in a certain category which has relative frequency of .26?

$$\text{rel freq} = \frac{\text{freq}}{\text{total}} = \frac{\text{freq}}{3400} = .26 \Rightarrow \text{freq} = 884$$

18 13. If from a data set with 14 observations the square of the sum is 63,504 what is the numerical value of the sample mean?

$$\bar{X} = \frac{\sum X}{n} = \frac{\sqrt{63,504}}{14} = 18$$

5 14. If from a data set with 65 observations the sum of squares is 1,753 and the square of the sum is 9,945 what is the numerical value of the sample standard deviation?

$$S = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}} = \sqrt{\frac{1,753 - \frac{9,945}{65}}{64}} = \sqrt{25} = 5$$

3 15. If a data set with five hundred observations had one hundred ones, fifty twos, two hundred threes, one hundred fifty fours what is the numerical value of the median?

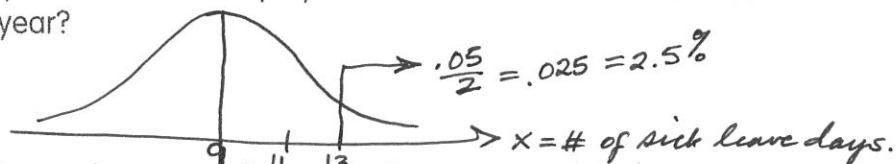
$1, \dots, 1_{100}, 2_{101}, \dots, 2_{150}, 3_{151}, \dots, 3_{350}, 4_{351}, \dots, 4_{500}$ median is value in the 250.5 position.

25% 16. If a data set with unknown shape has a mean of 212 and a standard deviation of 18 at most what percent of the observations would lie outside of the interval (176, 248)?

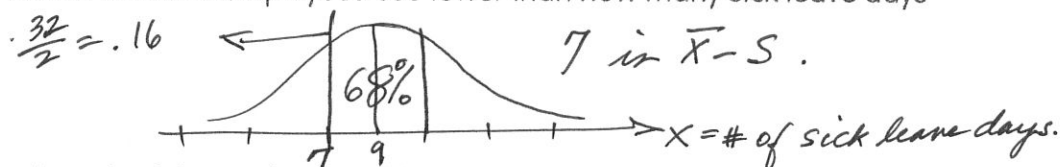
$(176, 248)$ is $\bar{X} \pm 2S$ contains @ least 75%. So, outside the interval is @ most 25%.

The number of days of sick-leave used in a year by state employees for the state of Oklahoma has a mound-shaped distribution with a mean of 9 days and a standard deviation of 2 days. Use this information to answer the remainder of the questions on this page. $\mu = 9, \sigma = 2$.

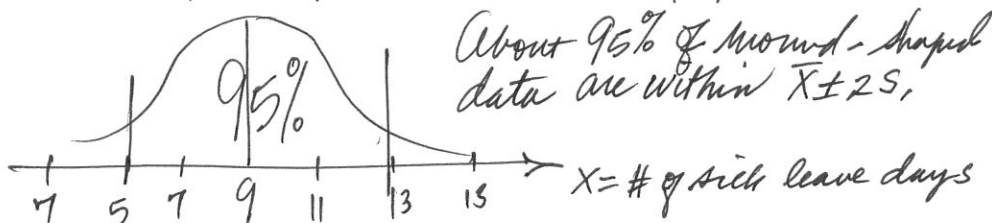
2.5% 17. Approximately what percent of state employees for the state of Oklahoma use more than 13 days of sick leave in a year?



7 18. About 16% of the state employees use fewer than how many sick leave days in a year?



(5, 13) 19. The number of sick leave days used by about 95% of all state employees is between what two values?



STATE THE ANSWER. State the answer on the line given.

(3 points each)

1.3 20. The grade distribution of a certain algebra test has a mean of 65 with a standard deviation of 10. What is the z-score associated with the exam grade of 78? State your answer with one digit past the decimal.

$$z = \frac{x - \bar{x}}{s} = \frac{78 - 65}{10} = 1.3$$

57 21. The grade distribution of a certain algebra test has a mean of 65 with a standard deviation of 10. What is the value of a student's exam grade if the z-score associated with the grade is -0.8?

$$x = \bar{x} + zs = 65 + (-.8)10 = 57$$

A random sample of six Great Blue heron was chosen in Payne and Pawnee Counties of Oklahoma. The standing height was measured on each bird. The heights recorded in inches are stated below. Use this sample of standing heights of blue heron to answer the remainder of the questions on this page. 44.8, 42.1, 49.9, 51.7, 44.2, 43.2

12,762.23 22. What is the numerical value of the sum of the squares for the above sample?

$$\sum x^2 = 44.8^2 + 42.1^2 + \dots + 43.2^2 = 12,762.23$$

76,120.81 23. What is the numerical value of the square of the sum for the above sample?

$$(\sum x)^2 = (44.8 + 42.1 + \dots + 43.2)^2 = 76,120.81$$

45.98 24. What is the numerical value of the mean of the above sample of heights? Round to two digits past the decimal.

$$\bar{x} = \frac{\sum x}{n} = 45.98\bar{3}$$

44.5 25. What is a numerical value for the median of the above sample of heights?

42.1 43.2 44.2 44.8 49.9 51.7

3.88 26. What is the numerical value of the standard deviation of the above sample of heights? Round your answer to two digits past the decimal.

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}} = 3.884027121$$

or
avg #
(44.2, 44.8)

44.5 is average of 44.2 and 44.8.

STATE THE ANSWER. State the answer on the line given.

(3 points each)

or 98% 0.98 27. Two computers on the same network both function properly 92% of the time. If one of the computers functions properly 96% of the time and the other computer functions properly 94% of the time what percent of the time is at least one computer functioning properly? $P(C_1 \cap C_2) = .92$, $P(C_1) = .96$, $P(C_2) = .94$

or 12% 0.12 $P(C_1 \cup C_2) = P(C_1) + P(C_2) - P(C_1 \cap C_2) = .96 + .94 - .92 = .98$
 28. Thirty percent of all drivers have a vehicle accident. The probability that a driver's automobile insurance goes up if he or she has an accident is 0.4. Based on this information what is the probability that an individual driver will have an accident and their automobile insurance will increase in price? $P(\text{accident}) = .30$, $P(\text{up\$} | \text{accident}) = .40$,
 $P(\text{accident} \cap \text{up\$}) = P(\text{up\$} | \text{accident}) \cdot P(\text{accident}) = .4(.3) = .12$.

Five hundred college students were questioned about whether or not they voted for Bill Clinton for president and whether or not they currently support impeachment of him. The results are shown in the following table. Use this table to answer the remainder of the questions on this page.

FEELING ABOUT IMPEACHMENT	VOTED FOR BILL CLINTON FOR PRESIDENT			
	Yes	No	Didn't Vote	
Supports Impeachment	30	102	116	248
Neutral	18	16	64	98
Does not Support Impeachment	104	22	28	154
	152	140	208	500

248
500 29. If one student is chosen at random what is the probability that the student supports impeachment of Bill Clinton?

$$P(\text{Supports Impeachment}) = \frac{248}{500}$$

30
152 30. If the one student chosen at random voted for Bill Clinton for president what is the probability that the student currently supports impeachment of him?

$$P(\text{Supports Imp} | \text{Voted for Bill}) = \frac{30}{152}$$

116
248 31. Given that a student who currently supports impeachment of Bill Clinton was chosen what is the probability that the student did not vote at all in the presidential election?

$$P(\text{NotVote} | \text{Supports Imp}) = \frac{116}{248}$$

30
500 32. What is the probability that if one student is chosen at random that the student supports impeachment and did vote for Bill Clinton?

$$P(\text{Supports Imp} \cap \text{Vote Yes}) = \frac{30}{500}$$

370
500 33. What is the probability that if one student is chosen at random that the student did vote for Bill Clinton or currently supports impeachment of him?

$$P(\text{Vote yes} \cup \text{Supports Imp}) = \frac{152 + 248 - 30}{500}$$