MATH114 COLLEGE MATH & STATISTICS 100pts TEST 4 SAMPLE p.1 INSTRUCTOR: CARLA MORRIS

NAME: Key

Your best 20 out of 21 will count 5 points each

In Problems 1 – 5 you are given the following data:

158, 191, 257, 135, 207, 158, 257, 261, 158, 184, 201, 187, 201, 201, 156, 226, 143

show your work to find

1. The mean

$\frac{158+191+\cdots+143}{17} = \frac{3281}{17} = \boxed{193}$

2. The median

$\frac{17+1}{2}$ = 9th position ranked 135, 143, 156, 158, 158, 158, 184, 187 **194**

3. The mode(s)

158 and 201

4. The range

$261 - 135 = \boxed{126}$

5. The variance

$\frac{(158-193)^2+\cdots+(143-193)^2}{17-1} = \frac{25322}{16} = \boxed{1582.625}$

6. Given the following chart below calculate the Mean of the data

$\frac{20(15)+50(4)+\cdots+140(14)}{15+\cdots+14}$

x	20	50	80	100	140
f(x)	15	4	21	16	14

$\frac{5740}{70} = \boxed{82}$

7. Give the 5% Trimmed mean for the following 20 values: (also state which two values are trimmed)

83	(15)	30	40	30	46	50	75	100	75
80	30	47	60	51	82	81	65	(127)	73

5% of 20 = 1 value

(.05)(20) = 1

Smallest value 15

largest value 127 > deleted

$\frac{83+\cdots+73}{18} = \frac{1098}{18} = \boxed{61}$

8. Give the coefficient of variation $\frac{s}{\bar{x}} \times 100\%$ for the following data: 10, 20, 50, 30, 40

$\bar{x} = \frac{10+20+50+30+40}{5} = 30$

$s = \sqrt{\frac{(10-30)^2+\dots+(40-30)^2}{4}} = \sqrt{250} \approx 15.811$

$\frac{15.811}{30} \times 100\% \approx 52.7\%$

9. A manufacturer of automobile batteries claims that the average length of life for its grade A battery is 60 months. Suppose the standard deviation of the life length is known to be 10 months and the frequency distribution of the life length data is unknown.
Use Chebyshev's Theorem to explain how to determine the approximate percentage of the manufacturer's grade A batteries that could be expected to last between 50 and 70 months, assuming the manufacture's claim to be true.

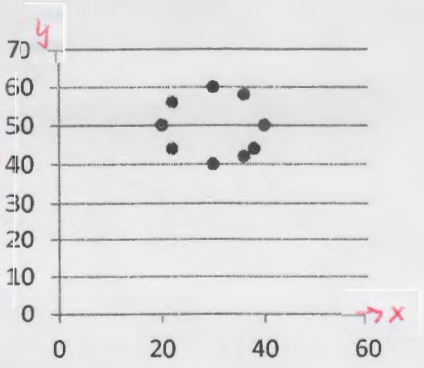
50 – 60 – 70
$\bar{x} \pm 1$ std

50 to 70 is an interval that is one std. dev. from mean. Possibly none of values are in this interval.

10. Given the five number summary 35, 50, 65, 115, 135
draw the corresponding Box and Whisker plot. see graph paper

11. Given the scatter diagram below the sample correlation coefficient, r, is most likely

a) Positive b) Zero c) Negative (give brief explanation as to your choice)



There seems to be no relationship (linear) between x and y

12. Suppose a committee of three people is to be chosen from a group of seven people. How many different committees can be formed consisting of a president, VP, and treasurer?

$P_3 = \frac{7!}{4!} = 210$

Since people chosen and given positions this is a permutation

13. What is the probability of drawing a red number from a standard deck of 52 cards?

2 red suits
9 no. cards per suit

$\boxed{18/52}$

14. What is the probability on a single roll of a die to get a number 3 or less?

1, 2, 3

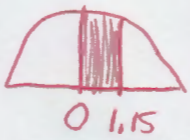
$\boxed{3/6}$

15. Evaluate ${}_9C_2$

$\frac{9!}{2!7!} = \frac{9 \cdot 8}{2} = \boxed{36}$

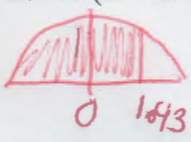
In Problems 16 - 19 Given a Normal Distribution find

16. Pr $(0 < Z < 1.15)$



$\boxed{0.3749}$

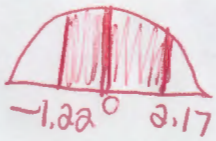
17. Pr $(Z < 1.43)$



$\boxed{0.9236}$

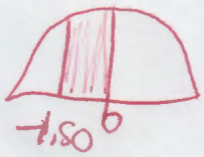
.4236
.5000
.9236

18. Pr $(-1.22 < Z < 2.17)$



0.3888
0.4850
$\boxed{0.8738}$

19. Pr $(-1.50 < Z < 0)$



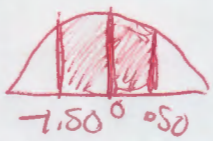
$\boxed{0.4332}$

Suppose scores on a M114 test are normally distributed with mean 70 and <u>standard deviation</u> 10.

20. Find the probability that a student scores between 55 and 75 on the test.

$\frac{55-70}{10} = -1.50$

$\frac{75-70}{10} = 0.50$



0.4332
0.1915
$\boxed{0.6247}$

21. Find the probability that a student scores less than 84 on the test.

$\frac{84-70}{4} = 1.40$

0.5000
0.4192
$\boxed{0.9192}$

MATH114 COLLEGE MATH & STATISTICS Test 4 Formula sheet

if n is odd the median is the (n + 1) /2 ranked data point

if n is even the median is the average of the n /2 and (n/2) +1 ranked data points

$${}_nP_r = \frac{n!}{(n-r)!} \qquad \bar{x} = \frac{\sum fx_i}{n} \qquad s^2 = \frac{\sum (x-\bar{x})^2}{n-1}$$

$${}_nC_r = \frac{n!}{r!(n-r)!} \qquad \bar{x} = \frac{\sum x}{n} \qquad z = \frac{x-\mu}{\sigma}$$

$$C.V. = \frac{s}{\bar{x}} \times 100\%$$

To compute a 5% trimmed mean

1) Order the data from smallest to largest.
2) Delete the bottom 5% of the data and the top 5% of the data. (If the calculation of 5% does not produce a whole number, round to the nearest integer.)
3) Compute the mean of the remaining 90% of the data

Chebyshev's Theorem: *For any set of data (either population or sample) and for any constant k greater than one, the proportion of the data that must lie within k standard deviations on either side of the mean is a t least*

$$1 - \frac{1}{k^2}$$

Box-and-Whisker Plot

1. **Draw a vertical scale to include the lowest and highest data values.**
2. **To the right of the scale, draw a box from Q_1 to Q_3.**
3. **Include a solid line through the box at the median level.**
4. **Draw vertical lines, called *whiskers*, from Q_1 to the lowest value and from Q_3 to the highest value.**

Sample Test 4 Math 114

#10 Box and Whisker Plot