Fall 2013 MATH 160 Exam #1 Form B (chapters 1- 3) 200 points

Name: Key 30

Instructions: May use one 3x5 index card (back/front, typed/written) and calculator.

(Round answers according to the rules talked about during lecture)

Lisa has been looking to move into a furnished two-bedroom apartment in La Mesa. After selecting a random sample of 10 apartment units, she came up with a list of what two-bedroom apartments are renting for.

$1300, $1290, $930, $1500, $1000, $2599, $950, $500, $1200, $1290 (outlier)

Example for Score

$\frac{25}{30} * 200 = 167$

1) Find the **5-number summary** of two-bedroom rentals in La Mesa.

Round to no decimal

Min = 500
$Q_1 = 950$
$\tilde{x} \rightarrow Q_2 = 1245$
$Q_3 = 1300$
max = 2599

If Summary is wrong can still get IQR correct

2) Calculate the IQR of two-bedroom rentals in La Mesa.

If wrong IQR can still get #3 correct based on #2's IQR

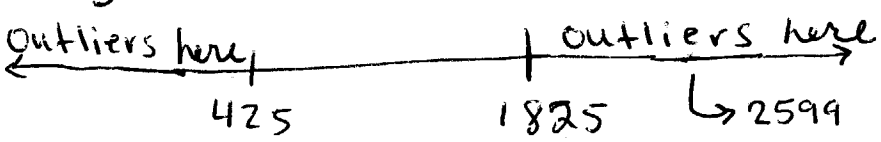
$IQR = Q_3 - Q_1 = 350$

3) Using the 1.5 * IQR rule, are there any outliers? What are they? **This is not just your opinion; you need to back up your answer with work.**

2 Parts answer then Explanation

$Q_1 - 1.5\ IQR = 950 - 1.5(350) = 425$

$Q_3 + 1.5\ IQR = 1300 + 1.5(350) = 1825$



$2599 is an outlier because it's greater than 1825

4) True/False Circle your choice.

F a) The Empirical Rule can be applied to data with ANY distribution. True (False)

F b) The age of students in this class is discrete data. True (False)

F c) It doesn't matter how a sample is collected as long as you have a very large sample. True (False)

T d) Asking people to call in to voice their opinion about an issue is NOT a valid way of collecting a random sample which is representative of the population. (True) False

T e) A parameter is a measurement that comes from the population. (True) False

T f) A statistic is a measurement that comes from a sample. (True) False

Correction on Form B only

5) The mean length of **one-year-old** spotted flounder, in millimeters, is 126 with standard deviation of 18. The mean length of **two-year-old** spotted flounder is 162 with a standard deviation of 28. The distribution of flounder lengths is approximately bell-shaped. Mark caught a one-year-old flounder that was ~~150~~ 190 millimeters in length and a two-year-old flounder that was ~~190~~ 200 millimeters in length.

a) **Find the z-score** for the one-year-old flounder that was 190 millimeters in length.

$\bar{X} = 126$ $S = 18$ $X = 190$

$Z = \frac{X - \bar{X}}{S}$ $Z = \frac{(190 - 126)}{18} = 3.5555\ldots$

Round to two Places $Z = 3.56$

b) **Find the z-score** for the two-year-old flounder that was 200 millimeters in length.

$\bar{X} = 162$ $S = 28$ $X = 200$

$Z = \frac{X - \bar{X}}{S}$ $Z = \frac{(200 - 162)}{28} = 1.357142857$

Round to two Places $Z = 1.36$

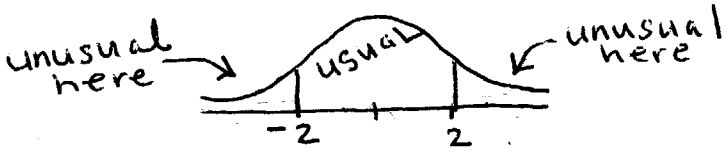
c) Which fish is longer, relative to fish the same age? Circle your choice.

(one-year-old flounder) / two-year-old flounder

$Z = 3.56$ is greater than $Z = 1.36$

NO points off for not Rounding

d) Is either fish an unusual length? **You must explain why.** Use Z-scores



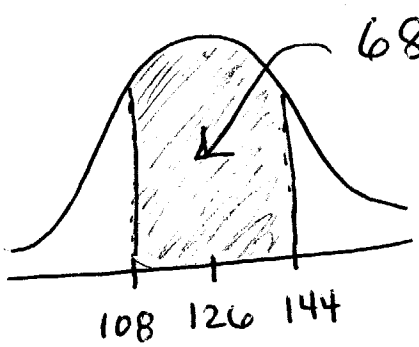
one-year-old $Z = 3.56$ is greater than $Z = 2$ so unusual

6) **Using the empirical rule**, approximate the percentage of one-year-old flounders that are between 108 millimeters and 144 millimeters in length. Assume the distribution of flounder lengths is approximately bell-shaped. The mean length of **one-year-old** spotted flounder, in millimeters, is 126 with standard deviation of 18. $\bar{X} = 126$ $S = 18$

$\bar{X} + 1S = 144$ $\bar{X} - 1S = 108$

$\bar{X} + 2S = 162$ $\bar{X} - 2S = 90$

$\bar{X} + 3S = 180$ $\bar{X} - 3S = 72$



108 & 144 are one Standard deviation away from mean

So Empirical Rule says 68% of data is found within 1 SD.

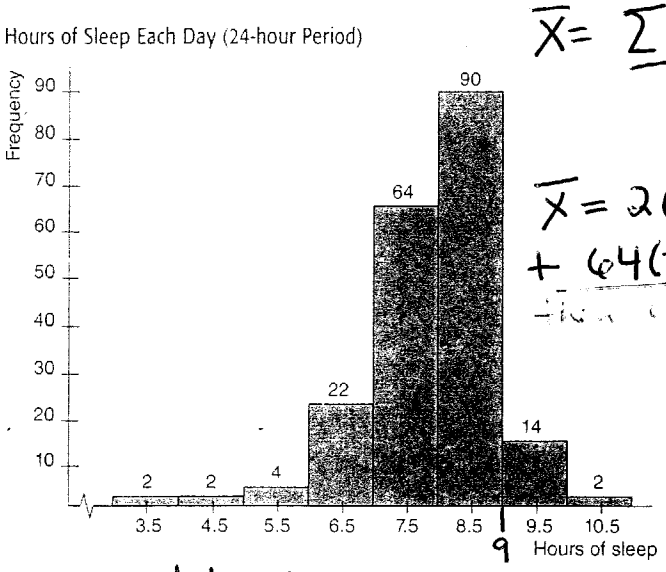
2 parts
1 S.D.
68%

may use 1-Varstats L_1, L_2

7) This histogram displays hours of sleep per day for a random sample of 200 subjects.

ON Calculator

L_1	L_2
3.5	2
4.5	2
5.5	4
6.5	22
7.5	64
8.5	90
9.5	14
10.5	2



Class midpoints (x)

$\bar{x} = \frac{\sum f \cdot x}{\sum f} = \frac{1580}{200}$

$\bar{x} = 7.9$

a) Find the mean hours of sleep.

$\bar{x} = 2(3.5) + 2(4.5) + 4(5.5) + 22(6.5) + 64(7.5) + 90(8.5) + 14(9.5) + 2(10.5)$

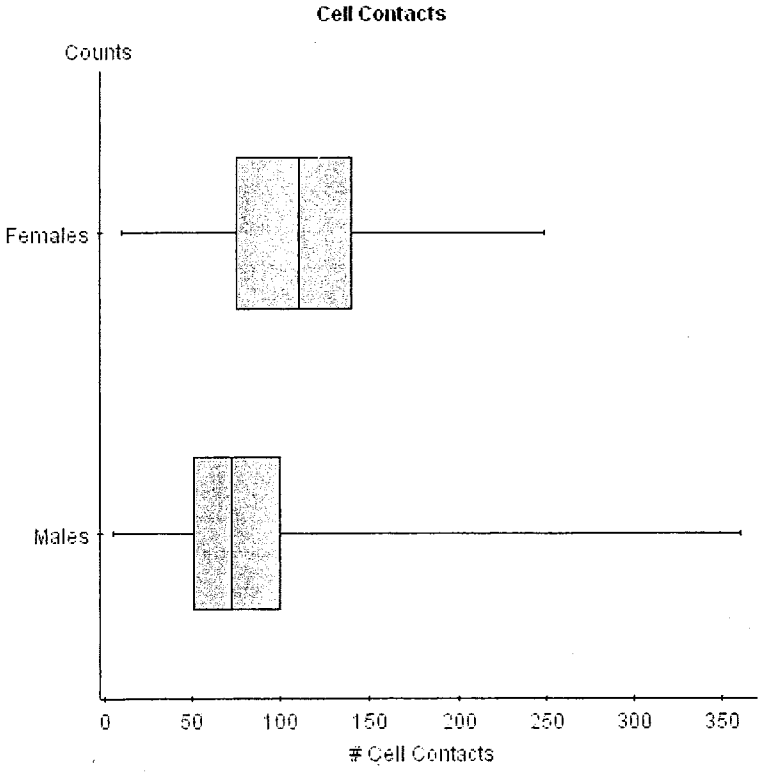
b) What percentage of people had less than 9 hours of sleep?

$\frac{90 + 64 + 22 + 4 + 2 + 2}{200}$

$\frac{184}{200} \approx .92$

92%

8) Below are two box plots for the number of cell phone contacts stored on phones owned by men and women.



a) What percentage of males have between 50 and 100 contacts on their cell phone?

$\approx$ 50%

b) What percentage of females have less than 75 contacts on their cell phone?

$\approx$ 25%

c) For males is having 350 contacts and outlier? **Explain.**

Yes

$Q_3 + 1.5\ IQR$

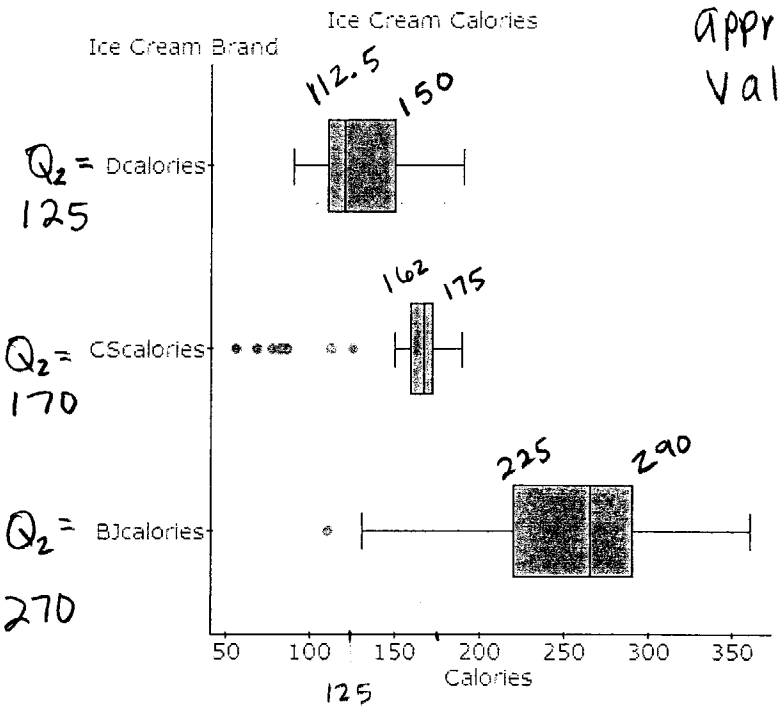
$\approx 100 + 1.5(Q_3 - Q_1)$

$\approx 100 + 1.5(100 - 50)$

≈ 175 approximation only

Since $350 > 175$ so that's an outlier

9) **Boxplot of calories in ice cream by brands.**



ONLY approx. values

Calculate the IQR for the calories in each brand of ice cream.

Dryers Ice Cream (D calories)
IQR = $Q_3 - Q_1$ $\Rightarrow 37.5$
$150 - 112.5$

Corner Stone (CS calories)
IQR = $Q_3 - Q_1$ $\Rightarrow 13$ Smallest
$= 175 - 162$

Ben & Jerry's (BJ calories)
IQR = $Q_3 - Q_1$ $\Rightarrow$ 65 largest
$290 - 225$

Which brand has the least variable calories in their ice cream?
Corner Stone (smallest IQR)

Which brand has the lowest median calories in their ice cream? Compare the Q_2

Dryers Ice Cream

The given frequency distribution lists the one-way commuting distances of workers in San Diego for the month of January.

Distances in miles	Frequency	Class Midpoints
1 - 8	2	4.5
9 - 16	8	12.5
17 - 24	20	20.5
25 - 32	12	28.5
33 - 40	8	36.5
41 - 48	1	44.5

10) Complete the table by finding the class midpoints.
See table

11) Find $\sum f$ (give the numerical answer) $n = 51$
↳ add frequency

12) What is the **class width**? 8

13) Find the **mean** number of miles driven in the month of January.
use 1-varstats L_1, L_2 or $\bar{x} = \frac{\sum f \cdot x}{\sum f}$
$\bar{x} = 23.48039216$ Round $\bar{x} = 23.5$
-½ for rounding error

14) Find the **standard deviation** for the number of miles driven in the month of January.
$S = 8.902786521$ Round $S = 8.9$

15) Find the **variance** for the number of miles driven in the month of January.
$S^2 = (8.902786521)^2 = 79.25960784$
Round Final answer
$S^2 = 79.3$

-½ for doing $(8.9)^2$ to get S^2

16) The mean of electrical energy consumption amounts for a home during a two-month period is 2767 kWh, and the standard deviation is 472 kWh.

$\bar{x} = 2767$
$s = 472$

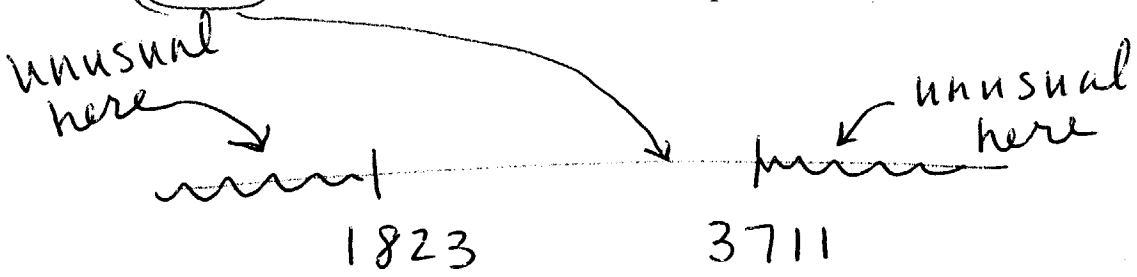
a) find the minimum "usual" value

$\bar{x} - 2s = 2767 - 2(472)$
$= 1823$

b) find the maximum "usual" value

$\bar{x} + 2s = 2767 + 2(472)$
$= 3711$

c) For one particular two-month period, the power company recorded consumption of 3700 kWh. Is that amount unusual? ~~Explain~~.



3700 kWh is not unusual (usual)
It is between the min & max usual values

don't take points off for not explaining