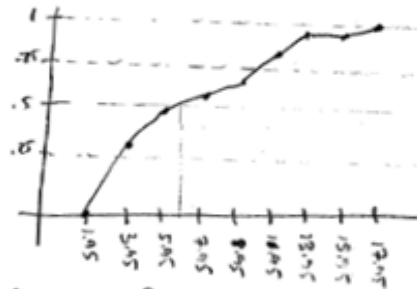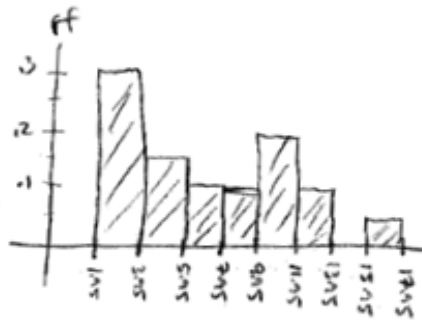# Math 10 MPS - Homework chapter 2 answers

1. The February 10, 2017 Nielsen ratings of 20 TV programs shown on commercial television, all starting between 8 PM and 10 PM, are given below:

2.1	2.3	2.5	2.8	2.8	3.6	4.4	4.5	5.7	7.6
7.6	8.1	8.7	10.0	10.2	10.7	11.8	13.0	13.6	17.3

a. Graph a stem and leaf plot with the tens and ones units making up the stem and the tenths unit being the leaf. (for example, 2.1 would have a stem of 2 and a leaf of 1)

b. Group the data into intervals of width 2, starting with the 1st interval at 2, and obtain the frequency of each of the intervals

c. Graphically depict the grouped frequency distribution in part b by a histogram.

d. Obtain the relative frequency, cumulative frequency and cumulative relative frequency for the intervals in part b.

e. Construct an ogive of the data. Estimate the median and quartiles.

f. Obtain the sample mean and median. Do you believe that the data is symmetric, right-skewed or left skewed?

g. Determine the sample variance and standard deviation.

h. Assuming the data are bell shaped, between which two numbers would you expect to find 68% of the data?

Stem and leaf plot:

```
2 | 1 3 5 8 8
3 | 6
4 | 4 5
5 | 7
6 |
7 | 6 6
8 | 1 7
9 |
10 | 0 2 7
11 | 8
12 |
13 | 0 6
14 |
15 |
16 |
17 | 3
```

class interval	f.req	rf	crf	class interval	cf
2-3.9	6	.30	.3	1.95 - 3.95	6
4-5.9	3	.15	.45	3.95 - 5.95	9
6-7.9	2	.10	.55	.	11
8-9.9	2	.10	.65	.	13
10-11.9	4	.20	.85	.	17
12-13.9	2	.10	.95	.	19
14-15.9	0	.00	.95	.	19
16-17.9	1	.05	1.00	15.95 - 17.95	20
	20		1		

(histogram and ogive)

(f) $\bar{x} = 7.465$ mode = +7.6

mod > $\bar{x}$ when mode, left skew

(e) $Q1 = 3.7$
med = 7
$Q3 = 10$

(g) $s^2 = 19.474$ $s = 4.413$

(h) 7.465 ± 4.413
$(3.052, 11.878)$

2. The following data represents recovery time for 16 patients (arranged in a table to help you out)

count	Days (X)	$X - \bar{X}$	$(X - \bar{X})^2$	Z Score
#1	2	-4	16	-1.27
#2	3	-3	9	-0.96
#3	4	-2	4	-0.64
#4	4	-2	4	-0.64
#5	5	-1	1	-0.32
#6	5	-1	1	-0.32
#7	5	-1	1	-0.32
#8	5	-1	1	-0.32
#9	5	-1	1	-0.32
#10	6	0	0	0.00
#11	6	0	0	0.00
#12	7	1	1	0.32
#13	7	1	1	0.32
#14	8	2	4	0.64
#15	8	2	4	0.64
#16	16	10	100	3.18
Totals	96		148	

a. Calculate the sample mean and median
   XBar=96/6 = 6   Median 5

b. Use the table to calculate the variance and standard deviation.
   $s^2 = 148/(16\text{-}1) = 9.867$ $s = 3.141$

c. Use the range of the data to see if the standard deviation makes sense. (Range should be between 3 and 6 standard deviations)
   Range/s=4.5, so the answer makes sense

d. Using the empirical rule between what two numbers should you expect to see 68% of the data? 95% of the data? 99.7% of the data?

   Within 1s   Within 2s   Within 3s
   **   2.86   -0.28   -3.42**
   **   9.14   12.28   15.42**

e. Calculate the Z-score for each observation. Do you think any of these data are outliers?

   See above – 16 seems to be an outlier more than 3 standard deviations above the mean.

3. The following average daily commute time (minutes) for residents of two cities.

City A	2	4	4	4	4	5	7	9	13	14	16	16	16	18	19	19
	21	21	21	27	30	35	37	38	47	48	50	59	70	72	87	97
City B	29	38	38	40	40	48	48	50	52	52	54	55	56	57	57	58
	58	58	59	59	59	62	62	63	66	66	67	69	69	71	75	89

a. Construct a back-to back stem and leaf diagram and interpret the results.
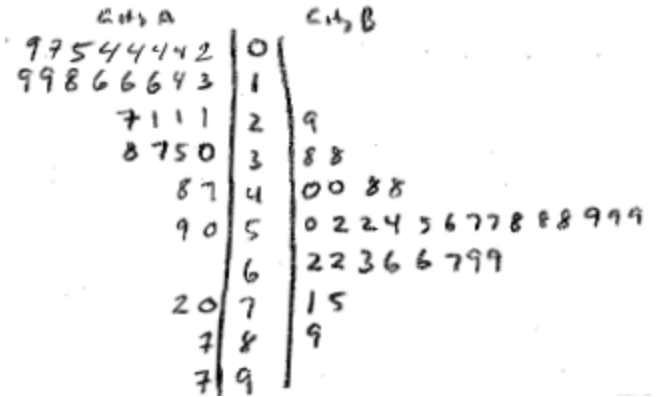
Results for A heavily skewed
" " B symmetric

City A more variability,
City B consistent, But longer

```
        City A            City B
   9 7 5 4 4 4 4 2  | 0 |
   9 9 8 6 6 6 4 3  | 1 |
           7 1 1 1  | 2 | 9
           8 7 5 0  | 3 | 8 8
               8 7  | 4 | 0 0 8 8
               9 0  | 5 | 0 2 2 4 3 6 7 7 8 8 8 9 9 9
                    | 6 | 2 2 3 6 6 7 9 9
               2 0  | 7 | 1 5
                 7  | 8 | 9
                 7  | 9 |
```

b. Find the quartiles and interquartile range for each group.
c. Calculate the 80th percentile for each group.

	Q1	Med	Q3	IQR	80%p
CITY A	11	20	42.5	31.5	48
CITY B	51	58	64.5	13.5	66

d. Construct side-by-side box plots and compare the two groups.

2   11   20   425   97
CITY A

29   51   58   64.5   89
CITY B
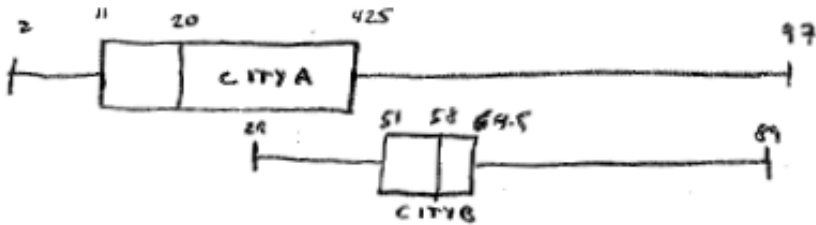
city A more spread out
city B longer commutes
Both sets skewed right.

e. For each group, determine the z-score for a commute of 75 minutes. For which group would a 75 minute commute be more unusual.

$$Z\text{-score} = \frac{75-\bar{X}}{S}$$

	X̄	S	Z
City A	29.06	25.55	1.81
City B	57.00	12.12	1.48

75 is more unusual for City A

4. The following data represents the heights (in feet) of 20 almond trees in an orchard.

14	14	14	14	15	18	18	20	21	21
22	24	25	25	25	27	27	29	31	45

    f.   Construct a box plot of the data.

    g. Do you think the tree with height of 45 feet is an outlier? Use both methods we covered in class to justify your answer.

14 16.5   21.5   26   fence 1

45

$IQR = 9.5$

Fence 1 = $26 + (9.5)(1.5) = 40.25$

(45 is a possible outlier)
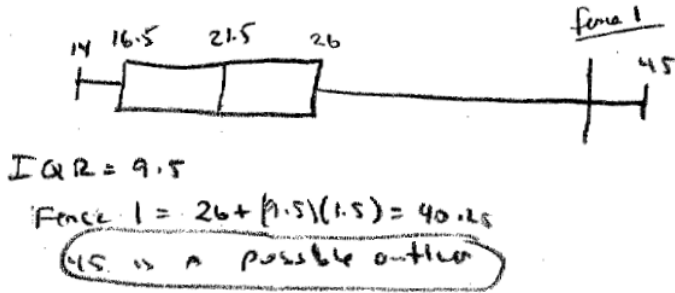
5. Rank the following correlation coefficients from weakest to strongest.

.343, -.318,   .214,   -.765,   0,   .998,   -.932,   .445

0, .214, -.318, .343, .445, -.765, -.932, .998