

Math 121: Exam 1
Summer – 2018
05/31/2018
70 Minutes

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Write your name on the appropriate line on the exam cover sheet. This exam contains 9 pages (including this cover page) and 8 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work. If you run out of room for an answer, continue on the back of the page — being sure to indicate the problem number.

Question	Points	Score
1	10	
2	10	
3	15	
4	8	
5	8	
6	9	
7	10	
8	10	
Total:	80	

1. (10 points) Create a stem-and-leaf plot for the following data values:

1.2, 1.4, 1.4, 1.6, 2.5, 2.6, 2.9, 3.0, 3.8, 3.8, 4.1, 5.2, 5.6, 7.2

Is the distribution of these data values symmetric, left skewed, or right skewed?

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

Stem Unit: 1

The distribution is clearly right skewed.

2. (10 points) A group of historians are studying the range of various trebuchets. The scientist tested 46 different trebuchets. The stem-and-leaf plot below gives the distances the various trebuchets were able to hurl a projection (in tens of feet).

3	0	0	3	4	5	5			
4	1	2	3	5	6	8	8		
5	7	8	9						
6	0	1	1	3	6	8	9		
7	0	0	1	2	3	5	5	7	9
8	0	0	1	1	2	3	5	5	
9	2	2	2	7	8				
10	0								

- (a) Find P_{30} , the 30th percentile.

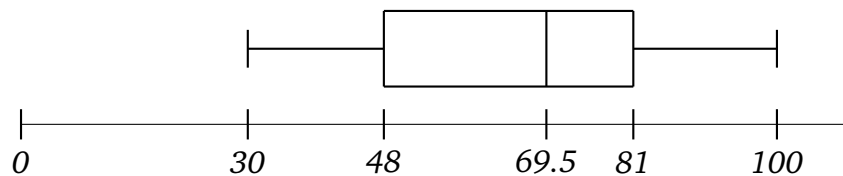
$$\# = \frac{30}{100} \cdot 46 = 13.8 \rightsquigarrow 14$$

The 14th number is 57. Therefore, $P_{30} = 57$.

- (b) Give the 5-number summary for the data.

Min	Q_1	Median	Q_3	Max
30	48	69.5	81	100

- (c) Sketch a box plot of the distances.



3. (15 points) Consider the following dataset:

$$-2, -1, -1, 0, 3, 3, 5, 9$$

(a) Find the range and midrange for this dataset.

$$\text{Range} = 9 - (-2) = 11$$

$$\text{Midrange} = \frac{9 + (-2)}{2} = \frac{7}{2} = 3.5$$

(b) Find the mean for this dataset.

$$\bar{x} = \frac{-2 + (-1) + (-1) + 0 + 3 + 3 + 5 + 9}{8} = 2$$

(c) Find the standard deviation for this dataset.

x	$x - \bar{x}$	$(x - \bar{x})^2$
-2	-4	16
-1	-3	9
-1	-3	9
0	-2	4
3	1	1
3	1	1
5	3	9
9	7	49
		Total: 98

$$s^2 = \frac{1}{n-1} \sum (x - \bar{x})^2 = \frac{1}{8-1} \cdot 98 = 14$$

Therefore, $s = \sqrt{14} = 3.74$.

4. (8 points) Identify whether the following survey methods are random, systematic, convenient, stratified, or clustered.

- (a) Convenient : A news station polls visitors to their website about their political opinions.
- (b) Random : A restaurant selects the winner of a free dinner contest by reaching into a large box filled with business cards and grabbing one.
- (c) Stratified : A marketing firm calls between 100 and 300 people in the 20 largest US cities to determine their consumer needs.
- (d) Convenient : An internet company sends a letter to all its customers asking if they have heard about their new television/internet package.
- (e) Systematic : A professor looks for cheating among students taking a final exam in a large lecture hall by examining the answer patterns on every 8th exam turned in.
- (f) Cluster : A fraud specialist examines all the financial records of eight large stock companies for fraud.
- (g) Stratified : A research team studies GPA in college majors. They examined 2,000 students: 1,323 English majors, 443 Computer Science majors, 158 Mathematics majors, and 76 Art History majors.
- (h) Convenient : To examine STD rates in a county, a clinic looks at STD test results from their clinic.

5. (8 points) Determine whether the following data is quantitative or categorical; the underlined word indicates the information considered:

(a) Categorical : I am a Freshman in college.

(b) Quantitative : My weight is 145 lbs.

(c) Quantitative : New York City has the most people of any US city.

(d) Categorical : Her gender is female.

(e) Quantitative : The student in the front has the highest GPA.

(f) Categorical : That shirt is blue.

(g) Categorical : That dog is a German Shepherd.

(h) Quantitative : The temperature is 92°F.

6. (9 points) Determine whether the given information is at the nominal, ordinal, interval, or ratio level of measurement. The underlined word indicates the information considered.

(a) Nominal : I am a Buddhist.

(b) Ordinal : It is too late in the evening to have a coffee.

(c) Interval : It is 28°F outside right now.

(d) Ratio : The dresser is 97 cm long.

(e) Interval : The time is 3:45 PM.

(f) Interval : The year is 1984.

(g) Ratio : An actuary can make as much as \$500,000 per year.

(h) Ordinal : That student was fifth in their class.

(i) Ratio : My mother bought eight items at the grocery store.

7. (10 points) Parker and Finn are salesmen at different companies where the sales by employees are approximately normally distributed. Parker works a computer store where the sales by employees have a mean of \$23,100 and standard deviation of \$1,300. Finn works at a hardware store where the sales by employees have a mean of \$8,300 and standard deviation \$250. If Parker had \$25,310 in sales last month and Finn had \$8,753 in sales, based off this information alone, who was the better salesman?

$$z_{Parker} = \frac{25310 - 23100}{1300} = 1.7$$

$$z_{Finn} = \frac{8753 - 8300}{250} = 1.812$$

Therefore, Finn was the better salesperson.

8. (10 points) A junkyard has a car crusher which can flatten a car in 85 seconds, on average. If the time the crusher takes to flatten a car is approximately normally distributed with standard deviation 5 seconds, what percent of cars can it flatten in 90 seconds or less?



$$0.13 + 2.14 + 13.59 + 34.13 + 34.13 = 84.12\%$$