

Final answers should have accuracy to 6 decimal places. Show some work how medians and means are computed. *Giving only the answer will bring you few points.*

1. (8pts) A city board would like to find out how much support there is for building an additional soccer field in the city park and wishes to survey the population. Answer whether each of the following methods will produce a good, bad or questionable random sample and comment why.

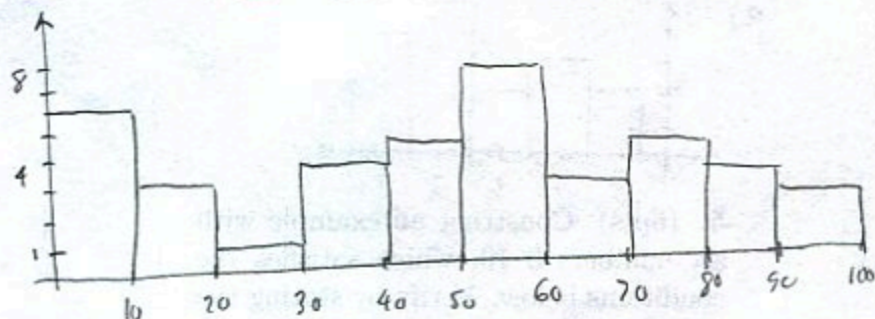
- a good bad iffy
 Surveying Saturday league's soccer players.
Too narrow a sample, also: sampling people with a likely highly biased view
- b good bad iffy
 Surveying random people from the city's property tax records.
While the best among options, this survey misses renters, who are significant part of the population
- c good bad iffy
 Surveying public library patrons.
Library patrons are probably less interested in sports than the average person, so sample is biased
- d good bad iffy
 Surveying movie theater visitors.
Moviegoers skew to the younger side, this sample might not include enough older people.

2. (16pts) Below are areas of US states whose areas are less than 100,000 square miles, rounded to the nearest thousand. Do the following:

- a) Construct a grouped frequency distribution with first class 1–10.
 b) Draw a histogram for the data.
 c) Enter a representative value for each interval.
 d) Estimate the mean of the data based on the frequency distribution.

52, 53, 6, 2, 66, 59, 11, 84, 58, 36, 56, 32, 40, 52, 35, 12, 11, 97, 37, 48, 70,
 77, 9, 9, 55, 54, 71, 45, 70, 98, 46, 2, 32, 77, 42, 35, 10, 43, 71, 24, 65, 98

Class	Frequency	Rep. value
1-10	6	$5.5 = \frac{1+10}{2}$
11-20	3	15.5
21-30	1	25.5
31-40	4	35.5
41-50	5	45.5
51-60	8	55.5
61-70	4	65.5
71-80	4	75.5
81-90	4	85.5
91-100	3	95.5



$$\bar{x} = \frac{6 \cdot 5.5 + 3 \cdot 15.5 + 1 \cdot 25.5 + \dots + 4 \cdot 85.5 + 3 \cdot 95.5}{6 + 3 + 1 + \dots + 4 + 3} = \frac{2111}{42} = 50.261905$$

3. (10pts) A hardware store manager examines over two weeks how many customers per day buy electrical equipment. The numbers are listed below.

a) Find the midrange of the data.

4, 7, 9, 3, 11, 8, 8, 9, 6, 7, 6, 4, 5, 9 (14 items)

b) Find the median of the data.

3, 4, 4, 5, 6, 6, 7, 7, 8, 8, 9, 9, 9, 11

c) Find the mean of the data.

$$a) \text{ midrange} = \frac{3+11}{2} = 7$$

$$\left(\frac{14}{2} = 7\right) \rightarrow 7^{\text{th}} \text{ and } 8^{\text{th}}$$

$$b) \text{ median} = \frac{7+7}{2} = 7$$

$$c) \bar{x} = \frac{3+4+4+5+6+6+7+7+8+8+9+9+9+11}{14} = \frac{96}{14} = 6.857143$$

4. (20pts) Over a semester, a student tracks how many homeworks are due every week. The numbers are shown below. Do the following:

a) Draw a histogram for the data.

$$b) \text{ midrange} = \frac{0+4}{2} = 2$$

b) Find the midrange of the data.

c) mode = 3 (most frequent data item)

c) Find the mode of the data.

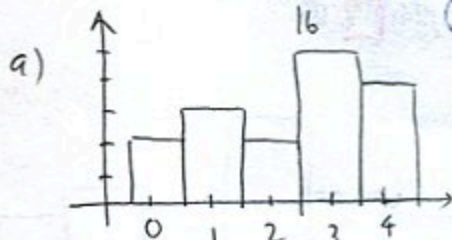
d) Find the median of the data.

d) median = 0, 0, 1, 1, 2, 2, 3, 3, 3, 4, 4
 $\frac{16}{2} = 8$ med 8th, 9th
 $\frac{3+3}{2} = 3$

e) Find the mean of the data.

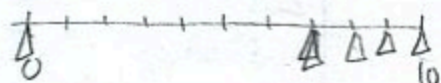
$$e) \bar{x} = \frac{2 \cdot 0 + 3 \cdot 1 + 2 \cdot 2 + 5 \cdot 3 + 4 \cdot 4}{2 + 3 + 2 + 5 + 4} = \frac{38}{16} = 2.375$$

Weekly homeworks	Frequency (weeks)
0	2
1	3
2	2
3	5
4	4



5. (6pts) Construct an example with six numbers 0-10, which satisfies the conditions below. Verify by stating the mean, median and mode for your example.

mean < mode < median



0, 7, 7, 8, 9, 10

$$\text{mean } \frac{65}{6} < \text{mode } 7 < \text{median } 7.5 = \frac{7+8}{2}$$

$$\frac{0+7+7+8+9+10}{6} = \frac{41}{6} = 6\frac{5}{6}$$