

## Reminders

1. HW 11.5, 12.1, 12.2 due 04/15, 11:59 pm
2. Exam #3 (Now a takehome exam  
It will be given out on Thurs 04/21  
It will be due on Tuesday 04/26)
3. Final Exam on May 03 3:30 - 5:30 pm
4. Last day of class is Tuesday 04/26

## Chap 12 - Statistics

### 12.1 Visual display of data

- Quantitative data (numerical)
- Frequency distribution
  - \* Ungrouped ~~data~~
  - \* Grouped
- Histogram
- Frequency polygon
- Leaf and stem plot

Qualitative data (Non-numerical)

- Bar chart
- Circle graphs
- Line graph

### 12.2 Measures of central tendency

Mean  
Median  
Mode

~~12.1~~

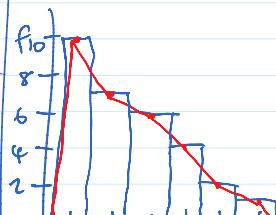
12.1

- ① Construct a frequency distribution and relative frequency distribution

1	1	3	1	0	3	0	0	2	1
2	2	0	0	5	3	4	0	1	0
4	2	0	2	0	1	0	1	2	3

x	(f) frequency	relative frequency $f/f_{\sum f}$
0	10	$10/30 = 33.33\%$
1	7	$7/30 = 23.33\%$
2	6	$6/30 = 20\%$
3	4	$4/30 = 13.33\%$

- ⑥ Draw an histogram for the freq distribution in ① above



1	7	$\frac{7}{30} = 23.33\%$
2	6	$\frac{6}{30} = 20\%$
3	4	$\frac{4}{30} = 13.33\%$
4	2	$\frac{2}{30} = 6.67\%$
5	1	$\frac{1}{30} = 3.33\%$
$\sum f = 30$		



(c) Draw a frequency polygon

### Grouped Frequency Distribution

Consider the data below

4 7 2 7 6 (1)  
7 2 9 8 8 X  
4 3 8 (9) 8 8  
9 2 6 5 2 7

Rule to construct a group freq distribution

1. Each data item belongs to one class
2. only use b/w 5 to 12 classes
3. choose a reasonable class width

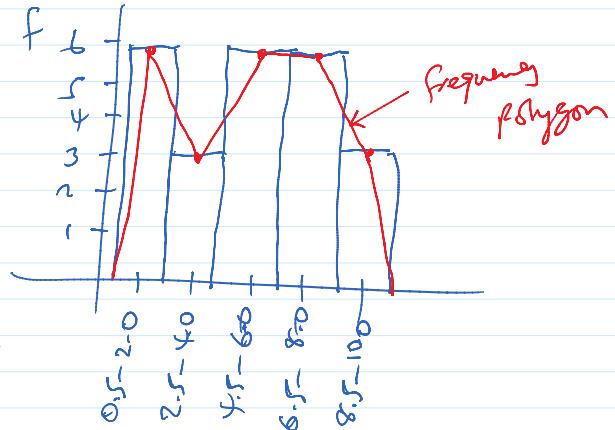
1. How many classes do we want  
we will use (5 classes)

$$\text{range } 9 - 1 = 8$$

2. I will use 1.6  
as my class width

(b) Draw an histogram

Class (unit)	Tally	f	relative frequency
0.5 - 2.0		6	6/24
2.5 - 4.0		3	3/24
4.5 - 6.0		6	6/24
6.5 - 8.0		6	6/24
8.5 - 10.0		3	3/24
$\sum f = 24$			



### Stem and leaf Display

#### Example

Draw a stem and leaf display of the data below

40 43 44 33 41

42 36 43 42 45

43 40 37 47 44

70 71 . . .

40	43	44	33	41
42	36	43	42	45
43	40	37	47	44
38	31	46	38	29

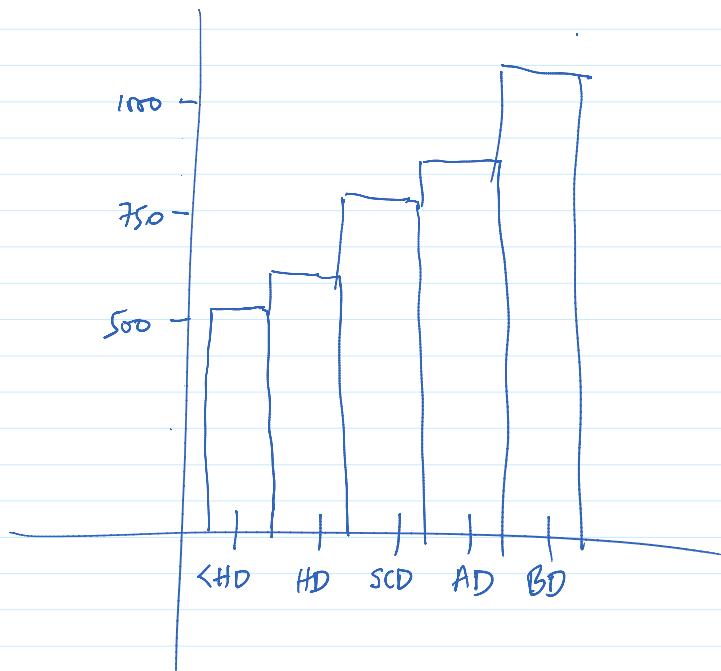
2	9
3	3 6 7 8   8
4	0 3 4 1 2 3 2 5 3 0 7 4 6

Qualitative data

Bar chart

Example

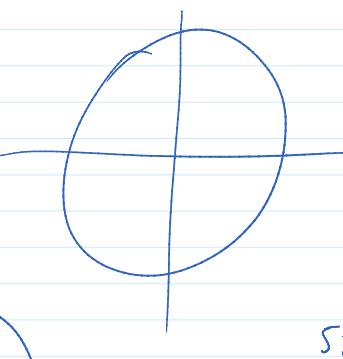
Educational level	\$ Median weekly wages
< High sch diploma	504
High sch diploma	692
Some college no degree	756
Associate degree	819
Bachelors degree	1156



Circle Graph (Pie chart)

Example

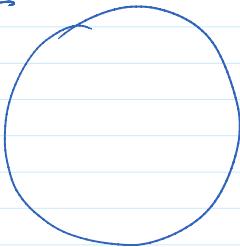
Investment category	Percent total degree
Stocks	55%



$$360^\circ \approx 100\%$$

= 55% in degrees

category	.....	.....	.....
Stocks	55%		
Bonds	20%		
Cash	15%		
Metals	10%		



55% in degrees  
0.55 (360) =

12.2

Mean

Arithmetic Mean

$x_1, x_2, \dots, x_n$

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

Example

Find arithmetic mean

6, 9, 12, 14, 21

$$\bar{x} = \frac{6+9+12+14+21}{5} = 12.4$$

Median

The data item in middle

Example find the median

6, 9, 12, 14, 21

median = 12

Mode

The data item with highest frequency

Example

find the mode

6, 9, 12, 14, 21

No mode

Find mean, median, mode for a ~~grouped~~ frequency distribution

Example

Consider the frequency distribution below

x	(f) frequency	f.x
615	13	7995
540	7	3780

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

- - - - -

615	13	7995
540	7	3780
605	9	5445
579	14	8106
586	7	4102
600	5	3000
$\sum f = 55$		$\sum f \cdot x = 32428$

$$\bar{x} = \frac{\sum f \cdot x}{\sum f} = \frac{32428}{55}$$

$$= 589.6$$

find the median for the above frequency distribution

$$\text{position of the median} = \frac{\sum f + 1}{2}$$

re-write the frequency distribution so that x's are in ascending order

X	f	Cumulative freq
540	7	7
579	14	21
586	7	28
600	5	
605	9	
615	13	
$\sum f = 55$		

$$\text{position of the median} = \frac{\sum f + 1}{2}$$

$$= \frac{55 + 1}{2}$$

$$= \frac{56}{2} = 28$$

median is 586

mode is 579