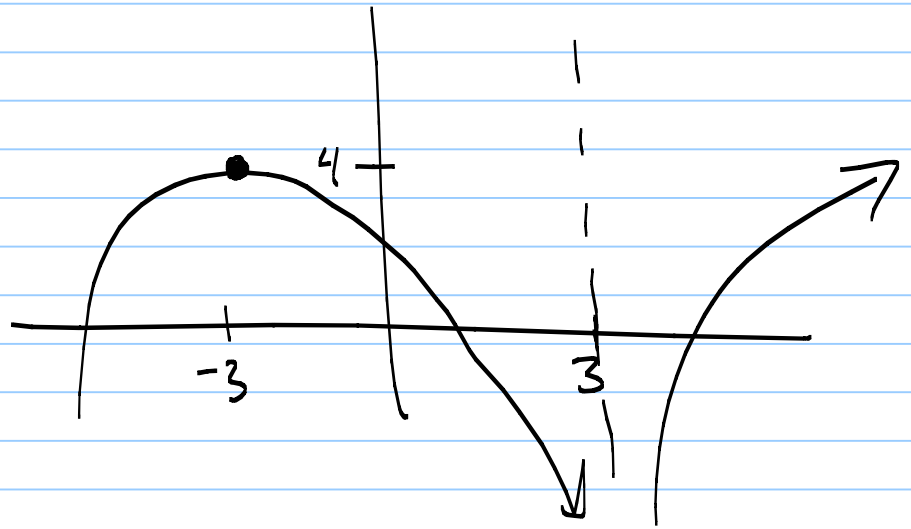
Tuesday, June

Note Title 6/9/2009

MAX / MIN / CONCAVITY

TO FIND RELATIVE EXTREMA — LOOK AT CRITICAL NUMBERS

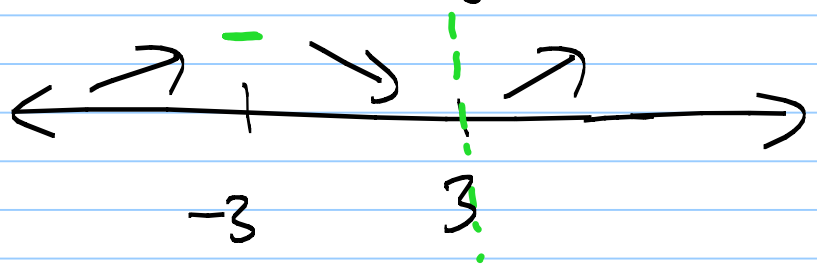
- BY THE WAY, CRITICAL NUMBERS ARE x-COORDINATES
- SOMETIMES, THERE'S A y-COORD THAT GOES W/ IT AND TOGETHER THEY MAKE A CRITICAL POINT

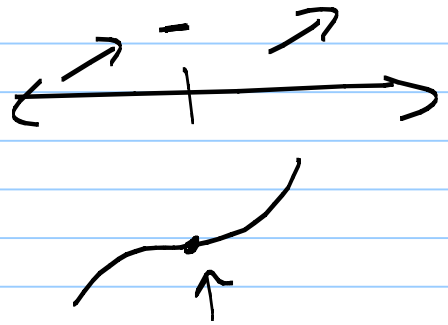


CN: $x = 3, -3$

CP: $(-3, 4)$

RELATIVE MAX/MIN: FIND CRIT #'S & MAKE A SIGN CHART FOR y'





ABSOLUTE MAX/MIN

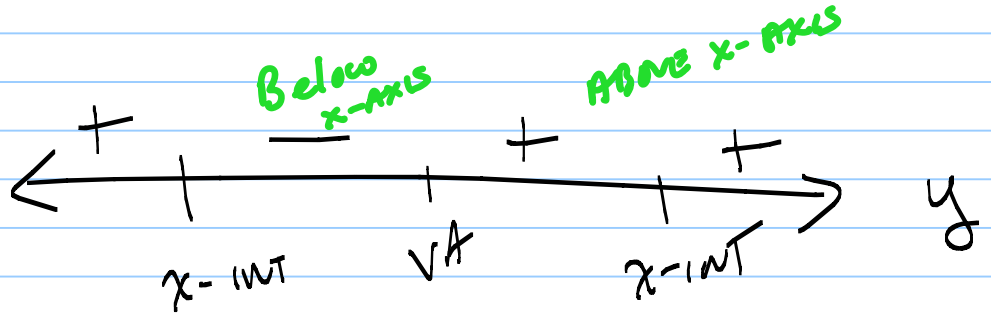
- CLOSE INTERVAL — CRITICAL POINT OR AN END POINT
  CONTINUOUS FCTN
- WHOLE DOMAIN — HAS TO HAPPEN AT A CRIT POINT.
  CONTINUOUS FCTN

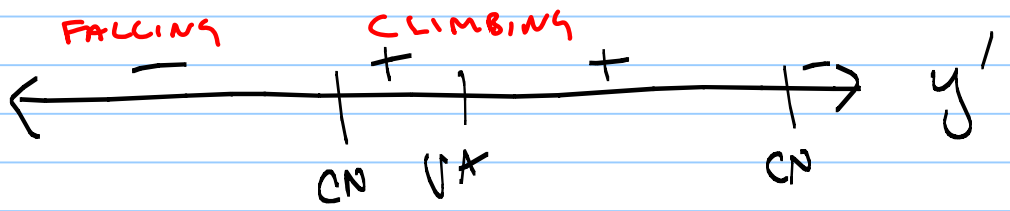
Derivatives & THE SHAPE of graphs of fcns

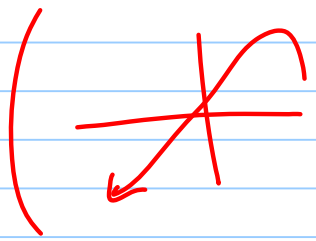
$y = f(x)$

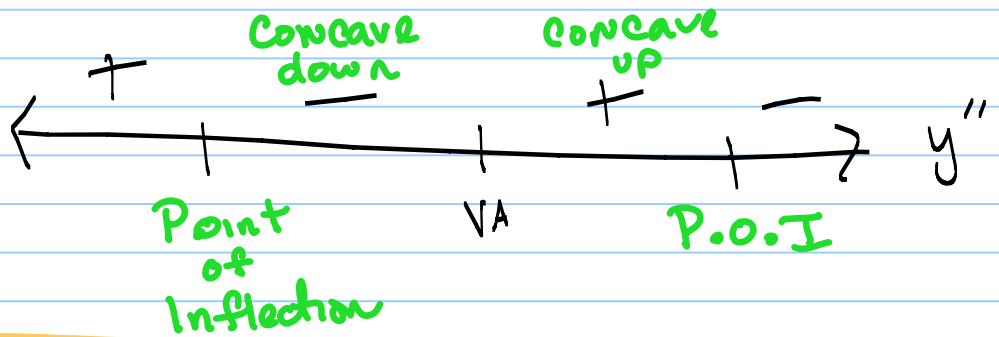
SC

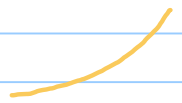
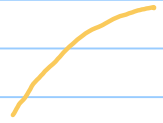
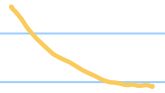
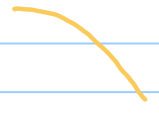
FIND ALL PLACES WHERE y, y', y'' FAIL TO EXIST OR $= 0$, LABEL THEM ON NUMLINE & CHECK SIGN OF y, y', y''.









$y' > y'' > 0$	$y' > 0, y'' < 0$	$y' < 0$ $y'' > 0$	$y', y'' < 0$
			

#24 (pg 33)

$$\sum_{n=2}^{\infty} \frac{3}{4^n} = 3 \sum_{n=2}^{\infty} \left(\frac{1}{4}\right)^n = 3\left[\sum_{n=0}^{\infty} \left(\frac{1}{4}\right)^n - \left(1 + \frac{1}{4}\right)\right]$$

$$= 3\left[\frac{1}{1-\frac{1}{4}} - \frac{5}{4}\right]$$

$$\sum_{n=0}^{\infty} r^n = \frac{1}{1-r}$$

$$= 3\left[\frac{4}{3} - \frac{5}{4}\right]$$

$$= 3 \cdot \frac{1}{12} = \frac{1}{4}$$

pg 36 #8

0 1 2 3 4

$1, \frac{4}{3}, \frac{9}{5}, \frac{16}{7}, \frac{25}{9}, \ldots$

$\frac{(n+1)^2}{2n+1}, n=0 \iff \frac{n^2}{2n-1}, n=1$

#7 $0.123123123\ldots$

$\frac{123}{1000} + \frac{123}{1000^2} + \frac{123}{(1000)^3} + \ldots$

$$\sum_{n=1}^{\infty} \frac{123}{1000^n} = 123 \sum_{n=1}^{\infty} \left(\frac{1}{1000}\right)^n = 123\left(\frac{1}{1-\frac{1}{1000}} - 1\right)$$

$$= 123 \left(\frac{1000}{999} - 1 \right)$$

$$= 123 \quad \frac{1}{999} = \frac{123}{999}$$

$0.0004\overline{4}$

$$\frac{4}{9999}$$

EX SHOW THAT

- $0.\overline{\sigma}$, WHERE σ IS A NATURAL NUMBER HAVING n DIGITS IS $= \dfrac{\sigma}{\underbrace{9\ldots9}_{n \text{ nines.}}}$

DATA / STAT

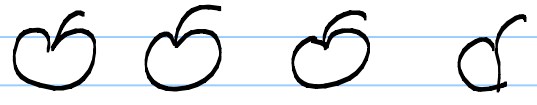
FREQUENCY TABLE

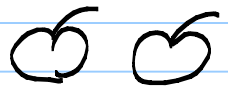
outcomes	# of times (FREQUENCY)
red	1
blue	8
purple	1

Relative FREQ. TABLE

outcomes	%
red	10%
blue	80%
purple	10%

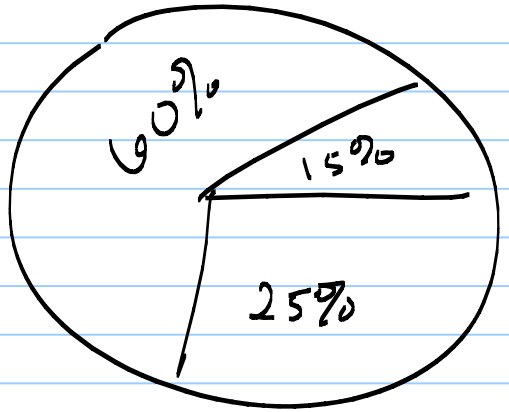
PICTOGRAPHS

1995 

2005 

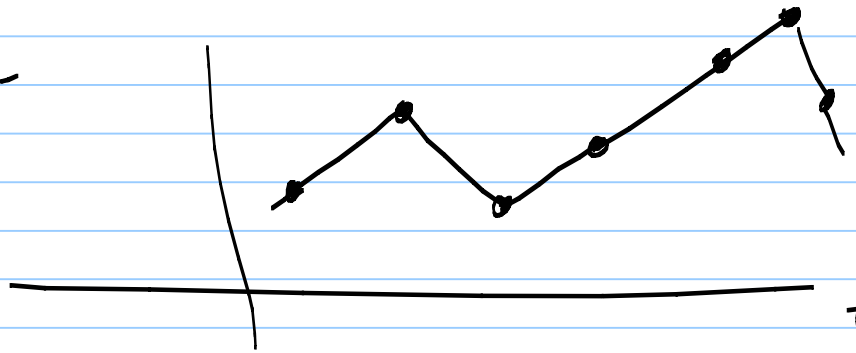
← EACH IS 100

PIE CHARTS



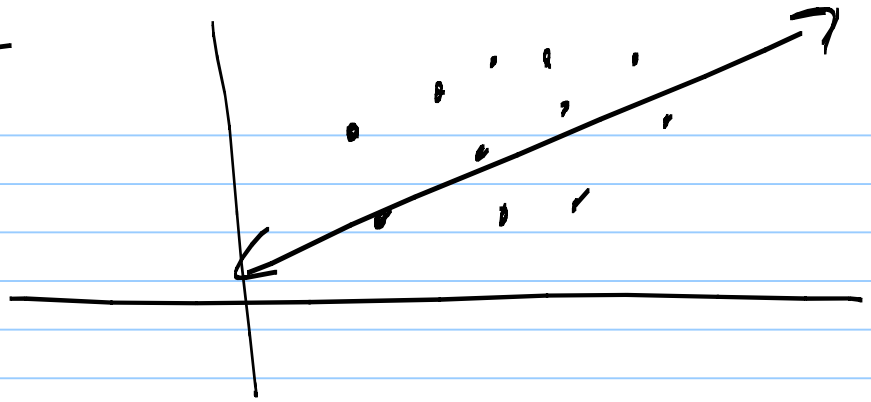
Not to scale

Line graph

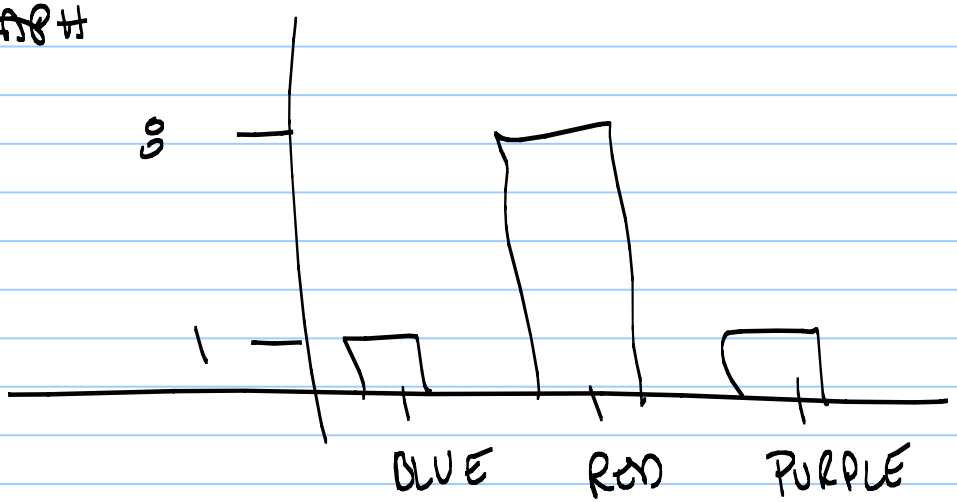


← real indep variable.

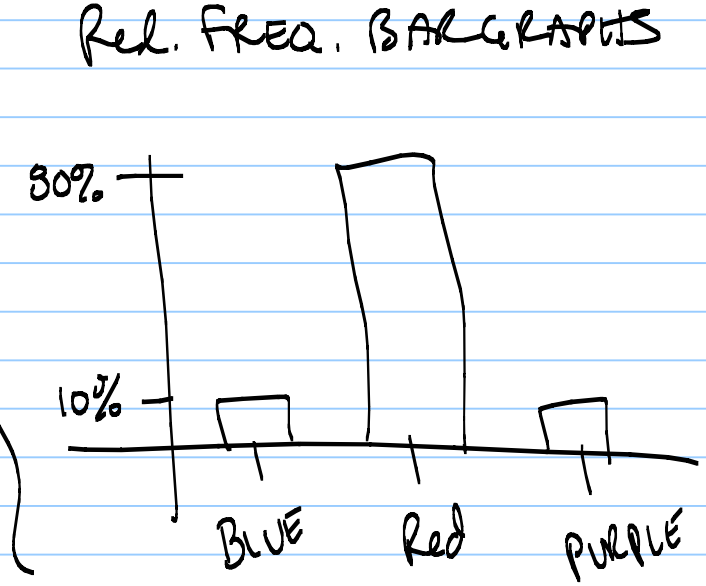
SCATTER PLOT



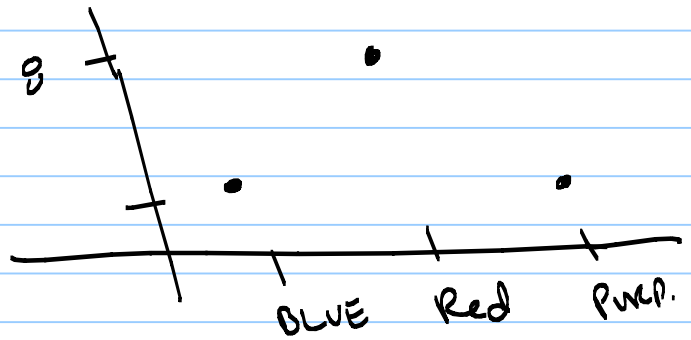
BARGRAPH

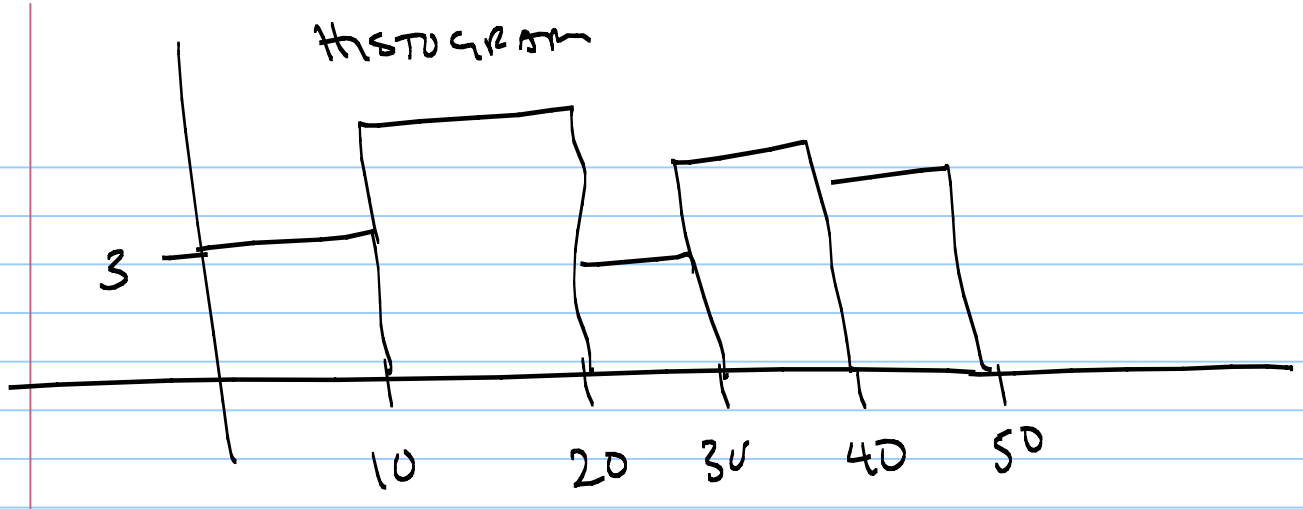


Rel. FREQ. BARGRAPHS



DOT PLOT





Measures of central tendancy

mean – average – $\frac{\Sigma \text{ data points}}{\text{\# of points}}$

- not a value itself
- EVERY VALUE contributes
- outliers contribute too

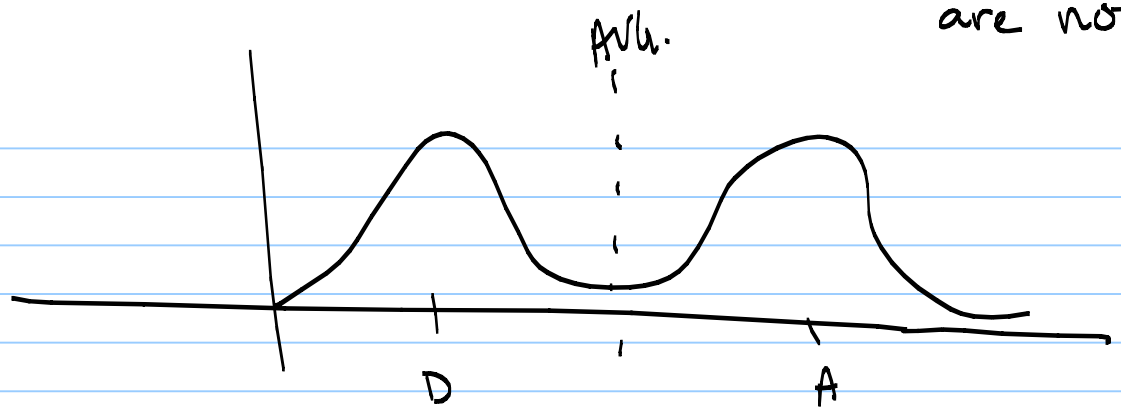
median – middle number
– avg of 2 middle #'s.

- not always in set
- not so affected by outliers

mode – most frequently occurring # in set.

- NOT THE mean
- IN THE SET
- A way to measure central tendancy when data

are not numerical.



weighted mean

$$\frac{\sum w_i x_i}{\sum w_i}$$

$\{3, 5, 5, 3, 3, 2, 1, 7, 5, 5, 5\}$

w_1 w_2 w_3

$$\text{mean} = \frac{1\cdot 1 + 1\cdot 2 + 3\cdot 3 + 5\cdot 5 + 1\cdot 7}{1 + 1 + 3 + 5 + 1}$$

x_i VALS.	w_i FREQ.
5	37
2	7
1	3
	47 ← $\sum w_i$

Measures of Dispersion

- RANGE → max − min

  [min, max]

- STANDARD DEVIATION

$$\sigma = \sqrt{\frac{\Sigma (x-\mu)^2}{N}}$$

size of population

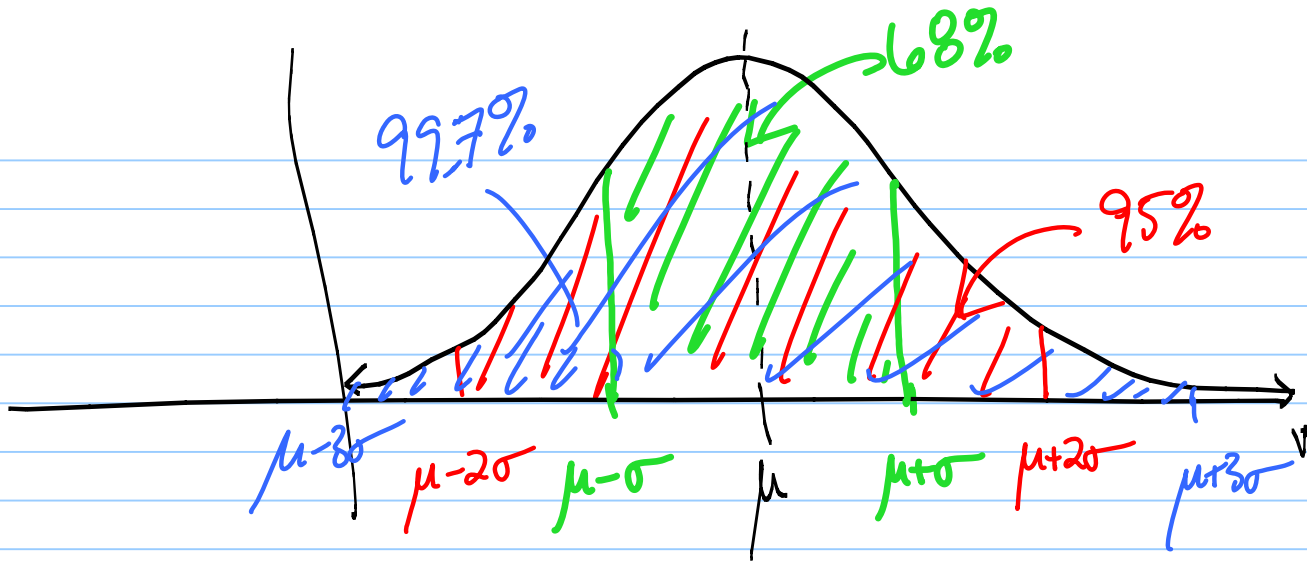
mean of population

$$s = \sqrt{\frac{\Sigma (x-\bar{x})^2}{n-1}}$$

size of sample

mean of sample

VARIANCE σ^2, s^2

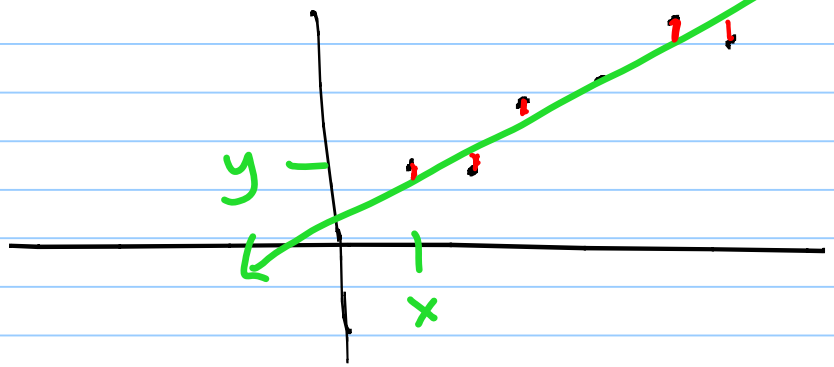


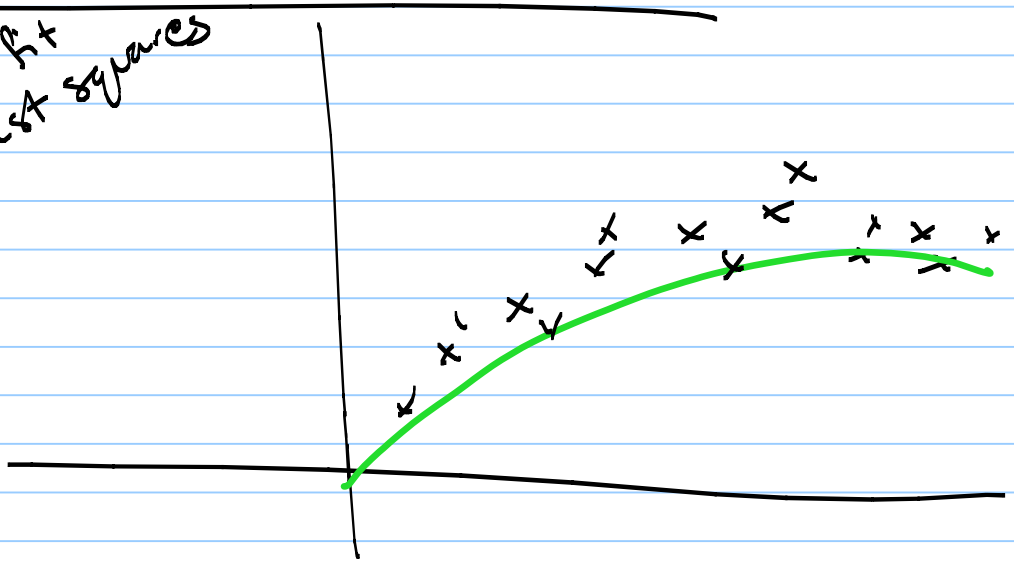
68-95-99.7 RULE

$$e^{-(x-\mu)^2/\sigma^2}$$

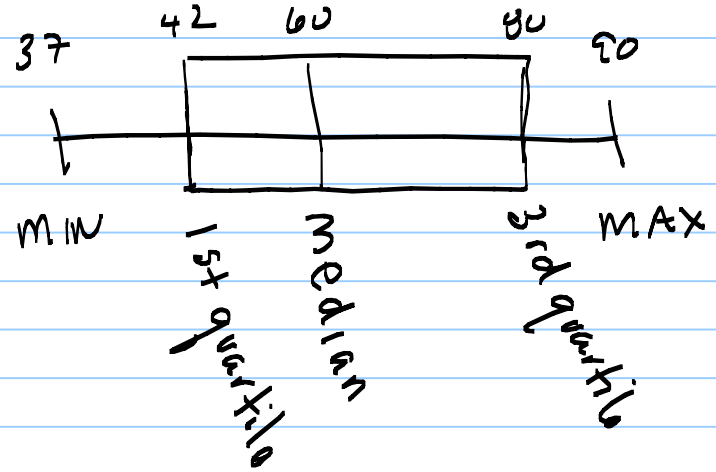
Regression line

Best fit least squares

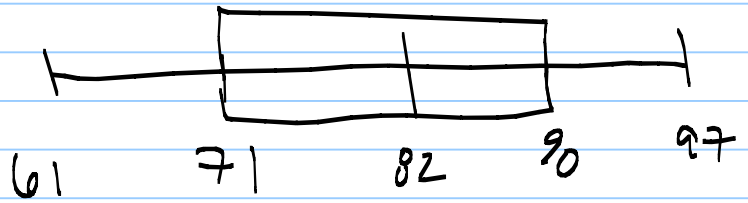




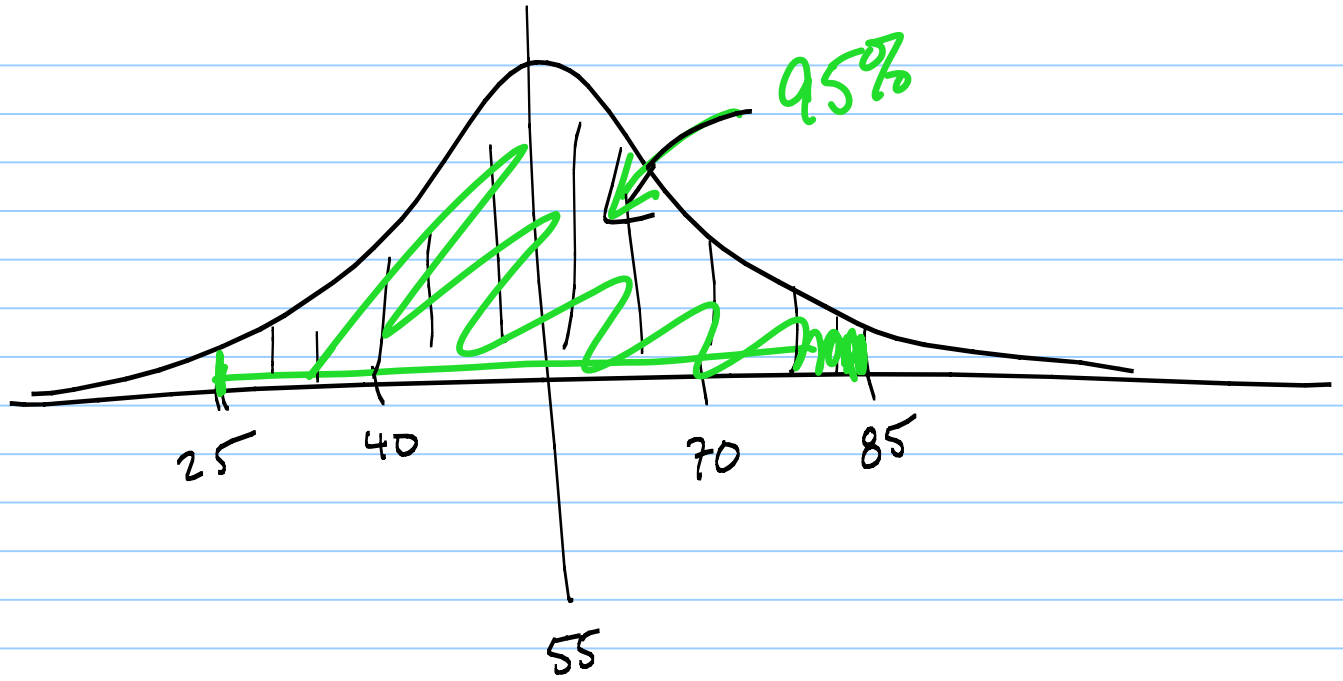
Box & whisker Plot

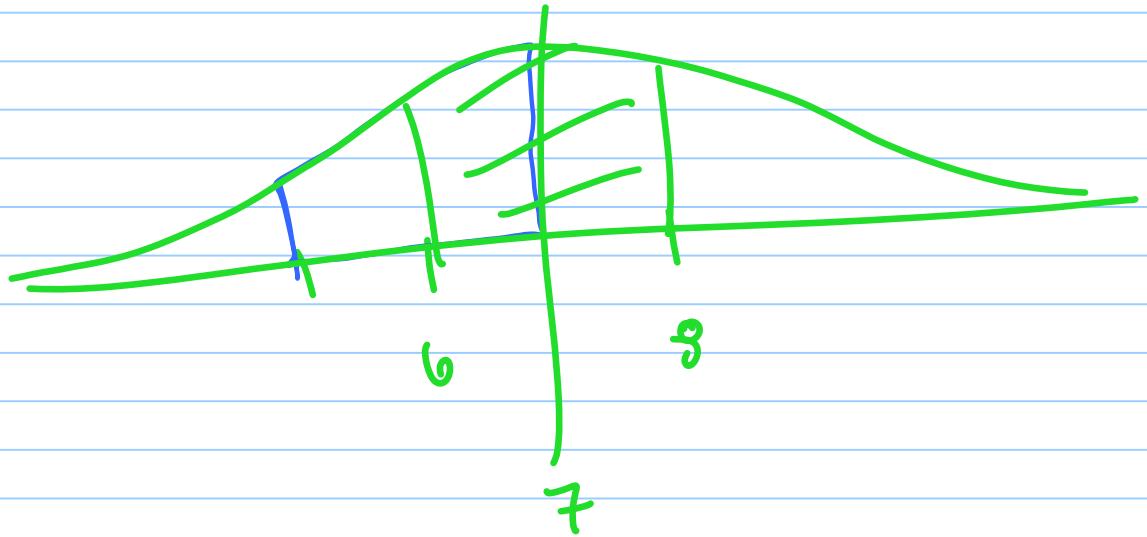


#6 DATA



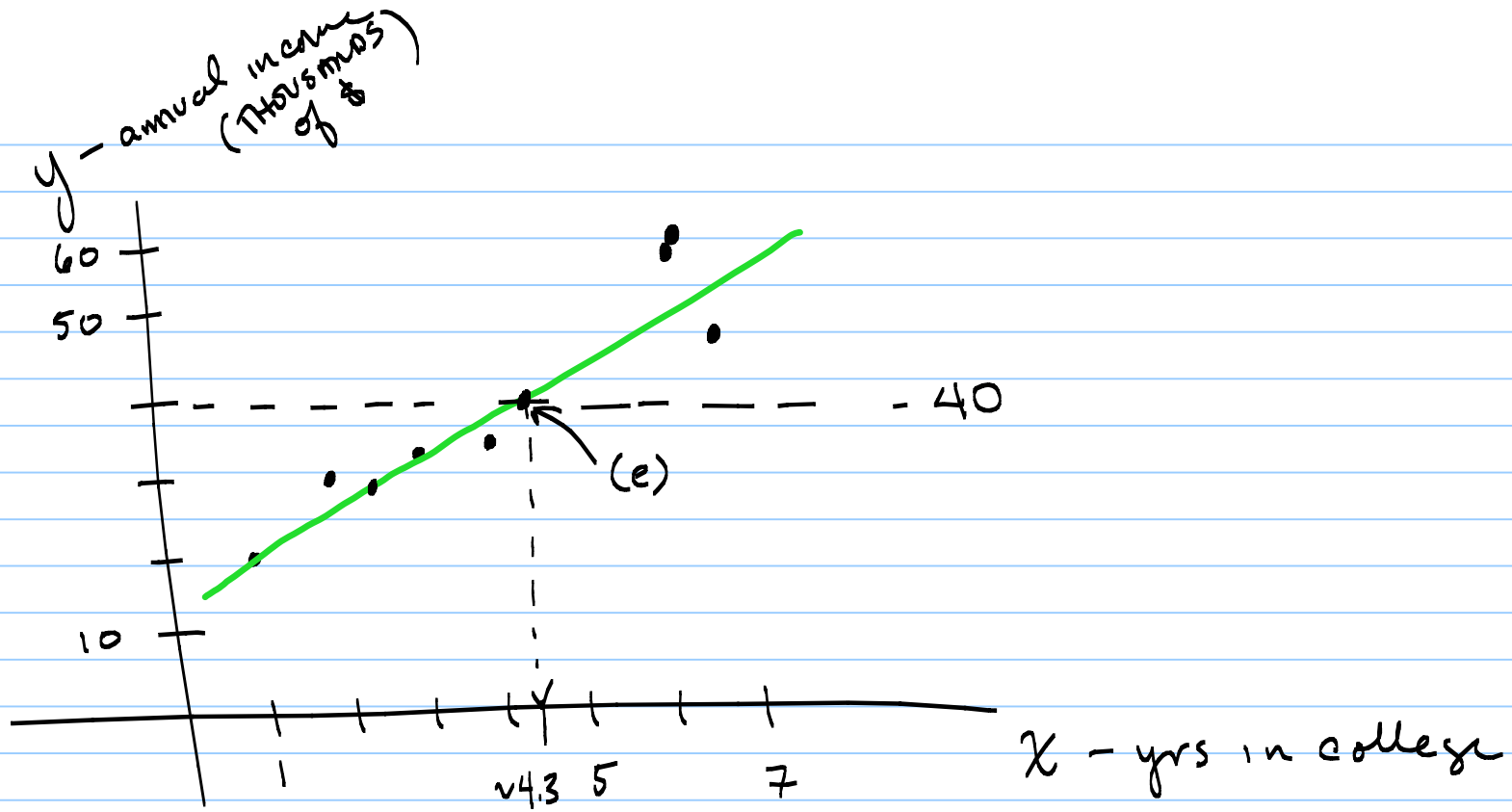
3





#1

a)



c) $y = 6.07x + 14.85$

d)

e) $y = 6.07 \cdot 5 + 14.85 = 45.2$ ← THIS MODEL PREDICTS THAT PERSON W/ 5 YRS OF COLLEGE EDUCATION WOULD

earn appx'ly $45,200/yr.

- USING THE APPX MODEL ON THE GRAPH FROM PART (b), A PERSON MAKING $40K/yr is expected to have 4.3 yrs of college educatin.