STT 200a 2-27-09

REVIEW FOR EXAM 2 (CONTINUES MONDAY 3-2-09)

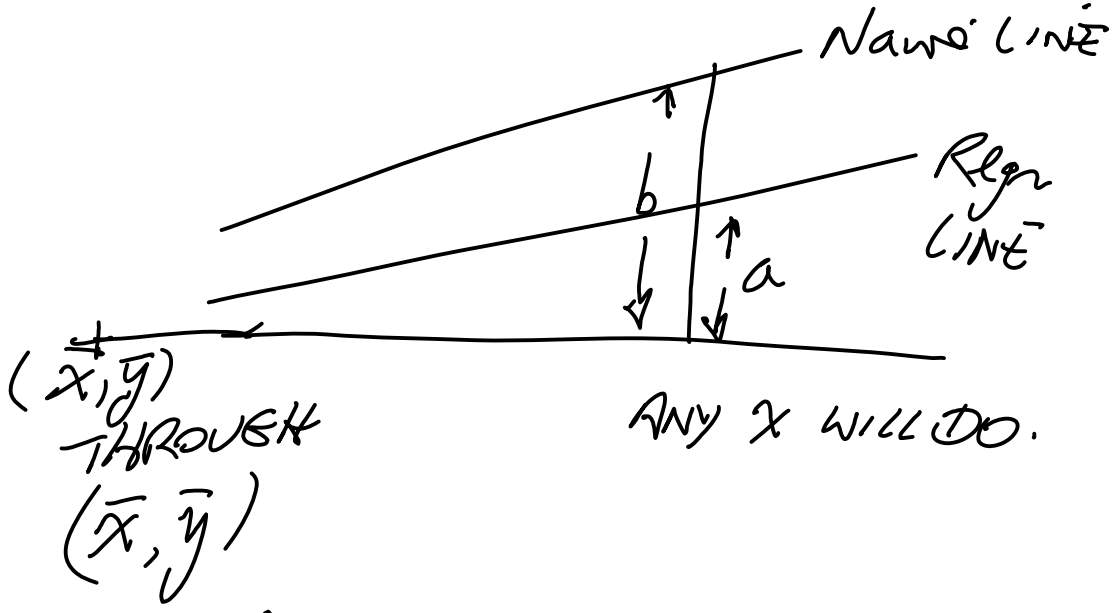
EXAM 2 IS IN RECITATION TUESDAY

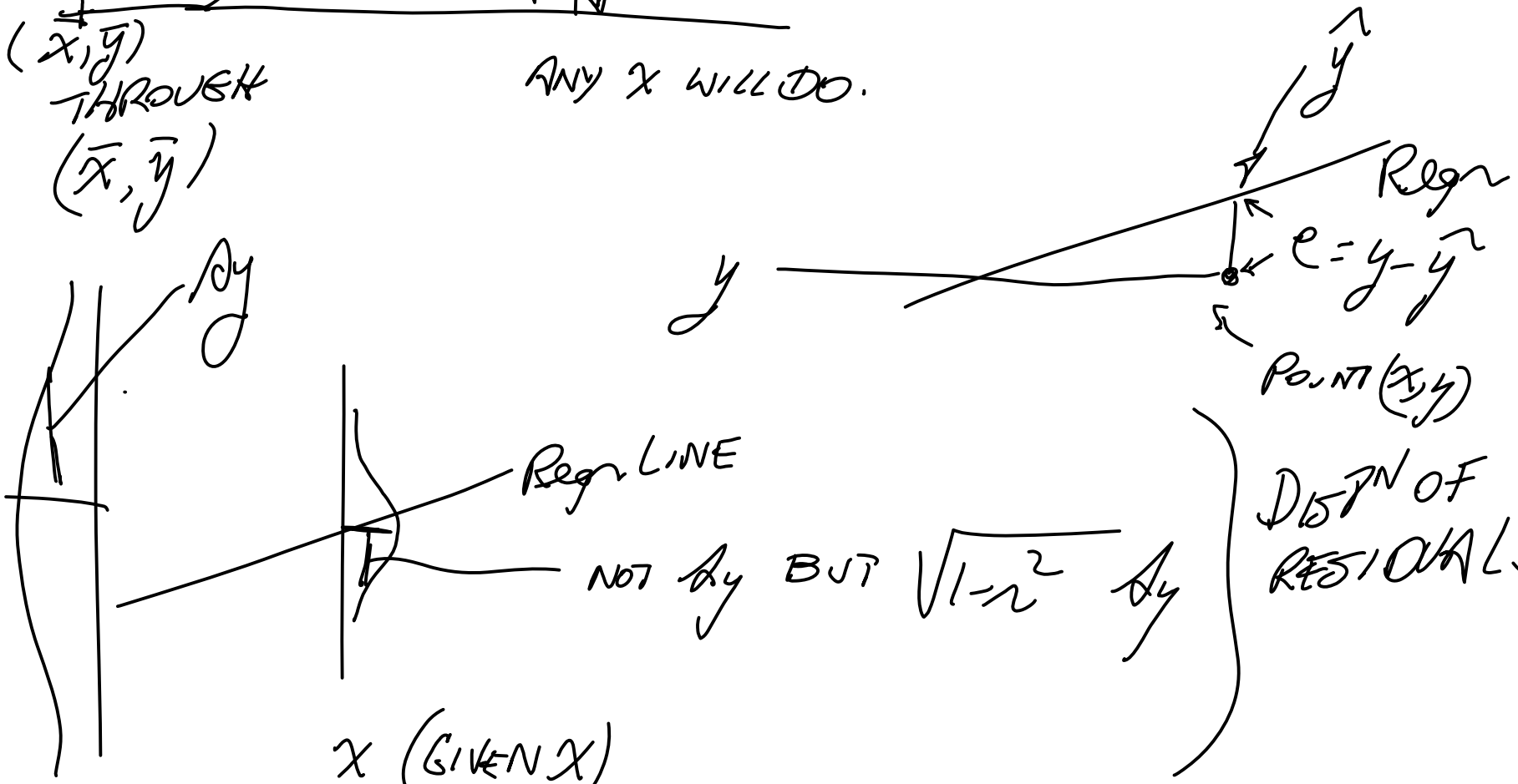
FRIDAY CLASS NEXT WEEK IS NOT MANDATORY.

(1) MONDAY I WILL POST A MATHEMATICA-BASED GRADE CALCULATOR (USE IS FROM A LAB).

(2) SEC. 001 DID NOT TAKE QUIZ LAST TUESDAY. (I WILL ANNOUNCE A REMEDY).

RECALL BASIC PICTURE OF STRAIGHT LINE REGRESSION


Navo LINE
Regn LINE
b
a
$r = \frac{a}{b}$
$(\bar{x}, \bar{y})$
THROUGH
$(\bar{x}, \bar{y})$
ANY x WILL DO.


$\hat{y}$
Regn
$e = y - \hat{y}$
y
POINT (x, y)
Δy
Regn LINE
NOT Δy BUT $\sqrt{1-r^2}\,\Delta y$
DISTN OF RESIDUALS
x (GIVEN x)

QUIZ 2. a. $R = 0.9$ $s_y = .36$ $\hat{b}_0 = 0.6$ $\hat{b}_1 = 0.3$ $\hat{b}_2 = -0.2$

MODEL $y = b_0 + b_1 x_1 + b_2 x_2 + \text{error}$

(x_1: SENSITIVITY TO TRIAL DOSE; x_2: BODY WT.)

DATA: y_i $(b_0?) + (b_1?) x_{1i}$ $(b_2?) x_{2i}$

CLOSE TO FITTING THE DATA.

L.S. MAKES THIS SMALL.

1. FRAC OF s_y^2 EXPLAINED BY REGR OF y ON x_1, x_2.

ALGEBRAIC FACT: $R^2 = 0.9^2 = .81$ ((6) .79)

2. PREDICT y IF SUBJECT HAS SENSITIVITY 0.7 AND WT 1.78

REGR PREDICTOR $\hat{y} = \hat{b}_0 + \hat{b}_1(.7) + \hat{b}_2(1.78)$ (x_1, x_2)

$= 0.6 + 0.3(.7) - (0.2)1.78 = .454$ ((6), 47)

3. FOR ELLIPTICAL PLOT, MEAN SCORE AT $x_1 = .7$ $x_2 = 1.78$ IS JUST $\hat{y} = .454$ ((6), 47)

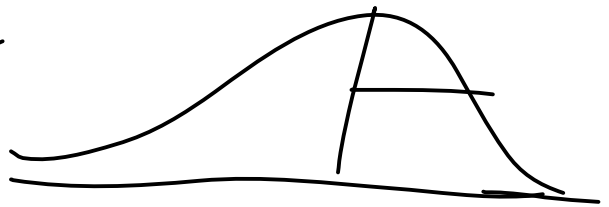
4. SPSE ELLIPSE, FOR $x_1 = 0.)$ $x_2 = 1.78$

$\sqrt{1-R^2}\,\sigma_y$

$\sqrt{1-.9^2}(.36)$

THE DIST OF y IS NORMAL

ANS. .157 ((b). .15)



$\bar{y} = .454$

5. IGNORE x_1, x_2

JUST LOOK AT y. $\bar{y}$ ESTIMATE IS $1.96\,\sigma_y/\sqrt{n}$

ANS. $1.96\,\frac{.36}{\sqrt{100}} = .070$ ((b) .08)

6. RANGE OF $R = [0,1]$ ((d) $[0,1]$)

$r = r[x,y]$

$R = r[y,\hat{y}] \geq 0$

7. CASTING ST. LINEREGR IN MLR SETUP. DATA

x	y
1	5
2	2
3	1

GIVEN

MLR SETUP NEEDS

1	1
1	2
1	3

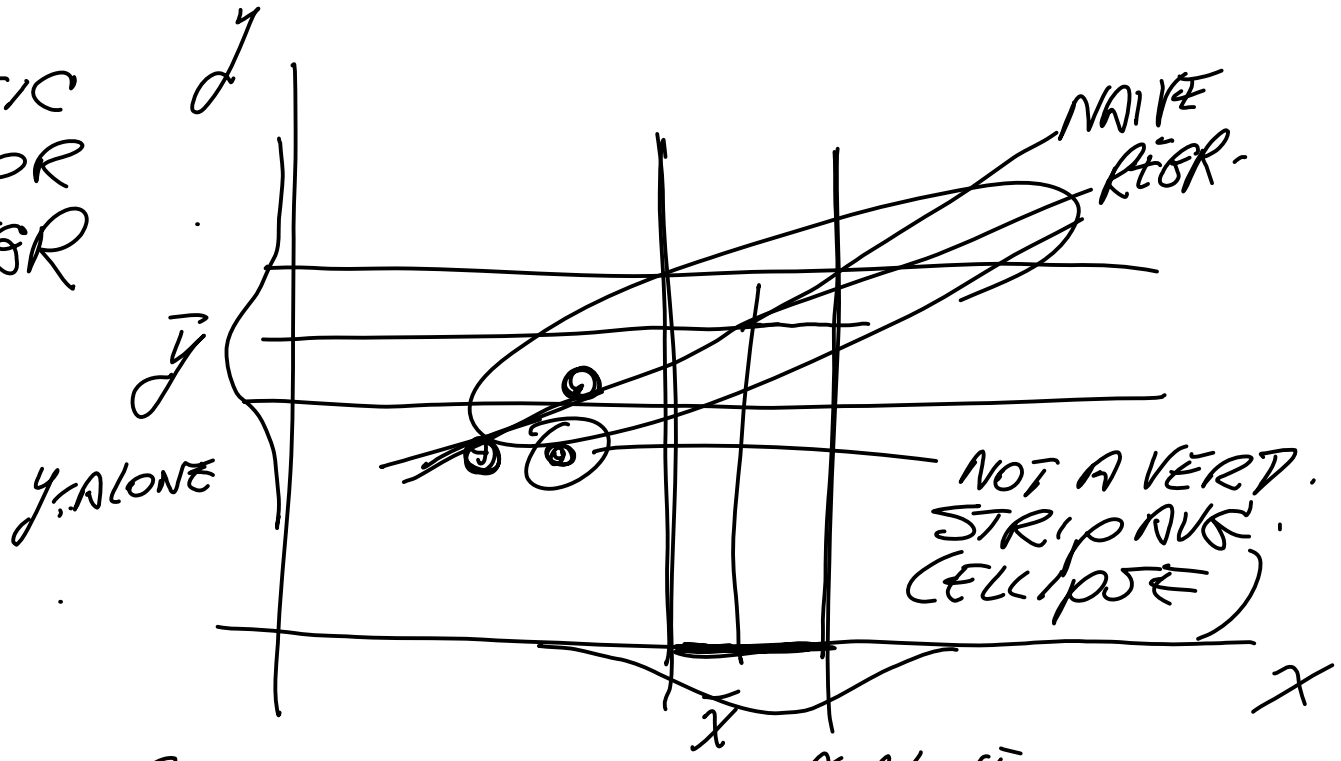
ENTER AS (CONST TERM, x_1)

myx = {{1, 1}, {1, 2}, {1, 3}} and (c).

Get a list[myx, myy]

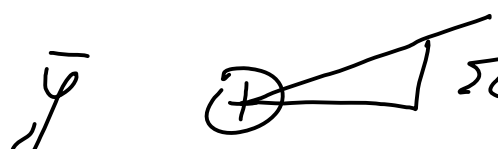
STT 200 b. 2-27-09

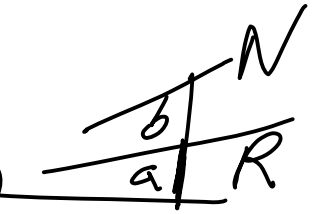
RECALL BASIC PICTURE FOR LINEAR REGR (ST. LINE)



(1) ASK FOR % OF PLOT (ALL (x,y) PAIRS) WITH x BETWEEN PARTICULAR LIMITS,

(2) ASK FOR SLOPE NAIVE; SLOPE REGR,

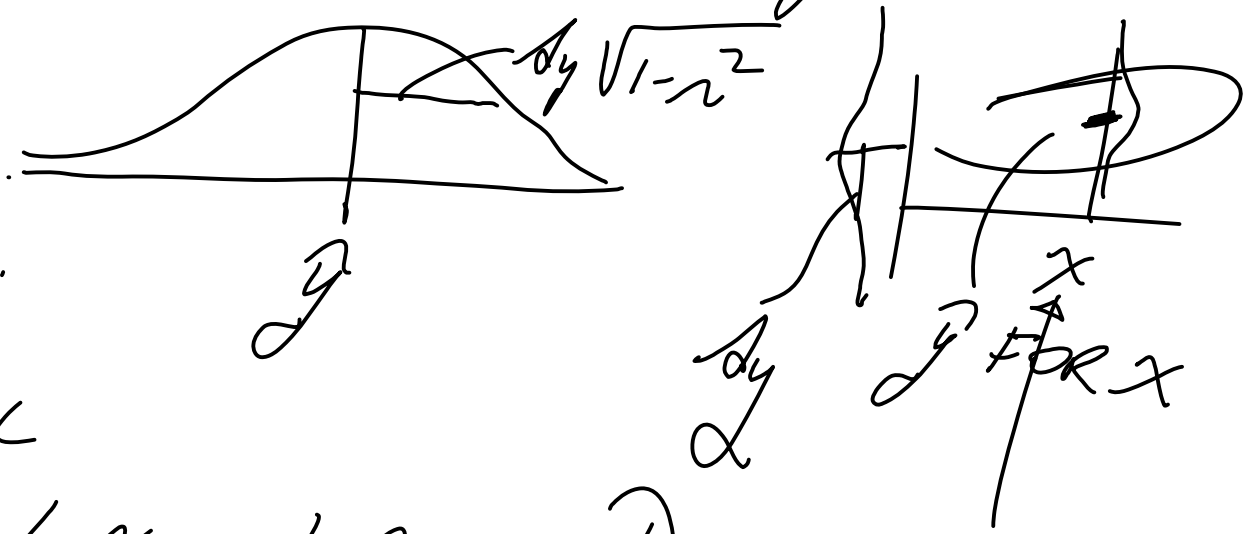




= RATIO $a/(a+b)$

(3) VERT STRIP AVGS PLOT AS REGR LINE.

(4) FIXING A PARTICULAR x, DIST^N OF y-SCORES AT THAT x IS



WE FIND THIS ALSO IN MLR.

eg SUPPOSE MODEL

$$y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3$$

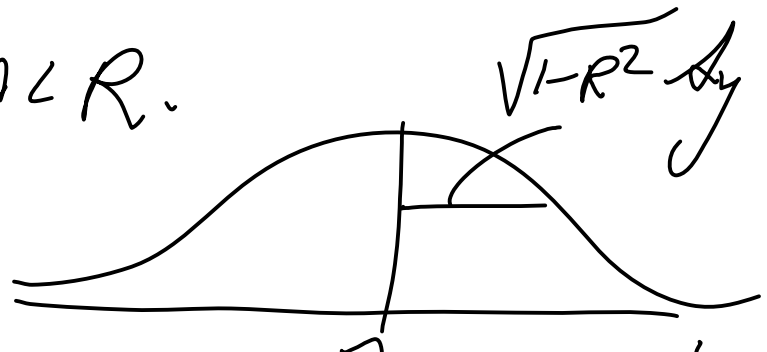
- y: CHILD'S HT AT MATURITY
- x_1: WT AT BIRTH
- x_2: HT AT BIRTH
- x_3: 1 FEMALE, 0 MALE

MLR. FIND $\hat{b_0}, \hat{b_1}, \hat{b_2}, \hat{b_3}$ FROM DATA (STUDY)

SAY $60'' \quad .02 \quad .6 \quad .03$

PREDICT $\hat{y} = 60 + .02(\text{WT}) + (.6)(\text{HT}) + .03(\underset{0\ \text{MALE}}{1\ \text{FEM}})$

SO TOO, FOR ELLIPTICAL MLR.
DIST OF y AT x_1, x_2, x_3 IS



TURN TO QUIZ 2 (b) $n = 100$

1-4 GIVEN: $R = 0.8$ $\sigma_y = .36$ $\hat{b}_0 = 0.3$ $\hat{b}_1 = 0.6$ $\hat{b}_2 = -.2$

MODEL y = RESPONSE = $b_0 + b_1 x_1 + b_2 x_2 + \text{error}$.

DATA LEADS TO ABOVE.

SENSITIVITY TO TRIAL DOSE; BODY WT

1. FRACTION OF σ_y^2 EXPLAINED BY MLR IS SIMPLE R^2.

ANS. $R^2 = .8^2 = .64$ ((a) .67)

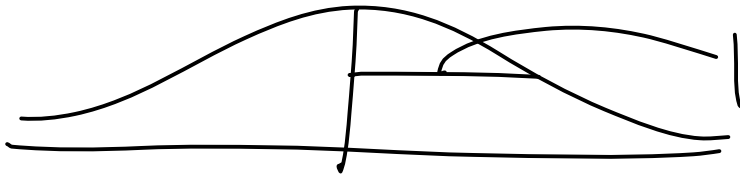
2. REGR PREDICTION $\hat{y}$ FOR A SUBJECT W/ SENSITIVITY TO TRIAL DOSE $x_1 = .7$ AND WT $x_2 = 1.78$

$$\hat{y} = \hat{b}_0 + \hat{b}_1(.7) + \hat{b}_2(1.78)$$
$$= 0.3 + 0.6(.7) + (-.2)1.78 = \boxed{.364} \quad ((a) .37)$$

3. SUPPOSE PLOT IS ELLIPTICAL $\hat{y}$ IS THE AVG SCORE FOR GIVEN x's (e.g. FOR SUBJECTS W/ $x_1 = .7$, $x_2 = 1.78$) ANS .364

((b) .37)

4. MEAN ELLIPTICAL PLOT FOR ALL SUBJECTS WITH $x_1 = .7$, $x_2 = 1.78$ THE DIST OF y = RESPONSE



$\sqrt{1-R^2}\,\sigma_y = \sqrt{1-.8^2}(.36)$
$= .216$

$\hat{y} = .364$ σ_y

A LOT OF SPREAD

((.1, .2))