

cannot estimate model $\rightarrow \beta$ is not unique need to drop

Multicollinearity: some x in linear function of another x

1st identify term in linear function

2nd drop some of them

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + u$$

$$x_1 = 2x_2 \rightarrow \text{same r.v. but different scale}$$

$$x_1 = kx_3 \rightarrow \text{drop } x_1 \text{ or } x_3$$

$$x_1 = a + bx_2 \rightarrow \text{drop Constant, } x_1, \text{ or } x_2$$

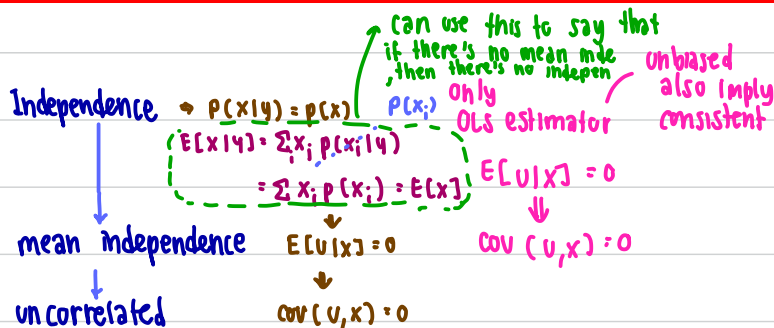
$$x_1 = a + bx_2 + cx_3$$

care only linear function

$$x_2 = x_1^2$$

but it's multicollinear if x_1 is dummy

$$\text{dummy} \begin{cases} 0 \rightarrow 0^2 = 0 \\ 1 \rightarrow 1^2 = 1 \end{cases}$$



$p \wedge q$	$p \leftrightarrow q$
$p \vee q$	$p \rightarrow q$
inde	mean
not inde	not mean
not inde	not independent
$p \rightarrow q \equiv \neg q \rightarrow \neg p$	
T	T \equiv T
T	F \equiv F
F	T \equiv T
F	F \equiv T

\Rightarrow if there's no mean inde, then there's no independent as well

Midterm: ^{10 pages} Write inside box only \rightarrow can use pencil, want very short, concise answer not essay

40 scores part 1: written test

40 part 2 & 3: use 2B

part 2: true or false, if you don't have enough info \rightarrow false

part 3: 4 choices \rightarrow let you answer twice

* will tell clearly the interpretation $\begin{cases} \text{correlation} \\ \text{causation} \end{cases}$

OLS = justify a little bit or add control

Exam design:

EASY 20% 30%

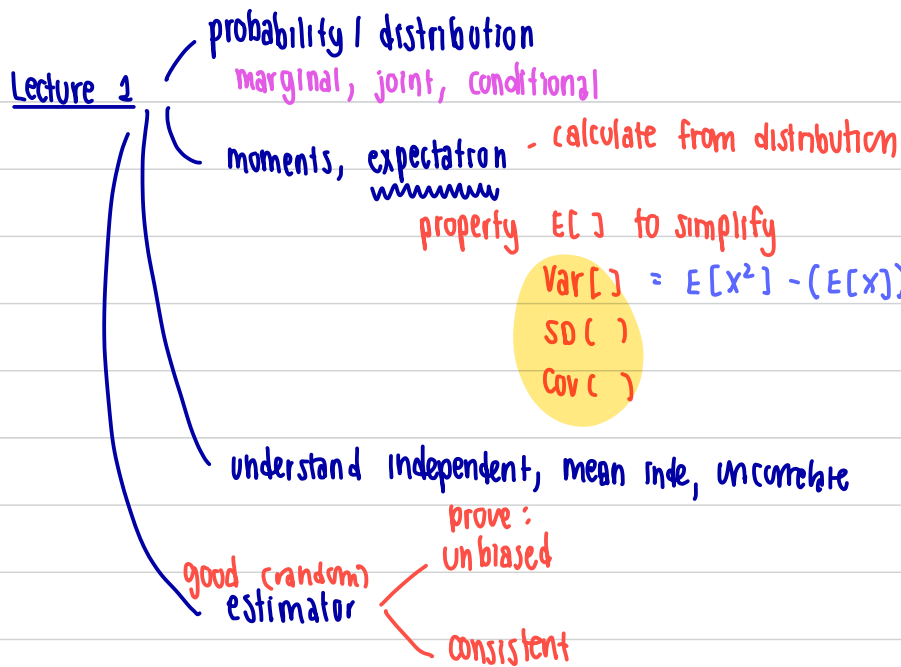
MEDIUM: require some calculation \rightarrow Hypo test 40% - 60%

HARD: don't see before 20 - 30%

CE but use 2-sided test

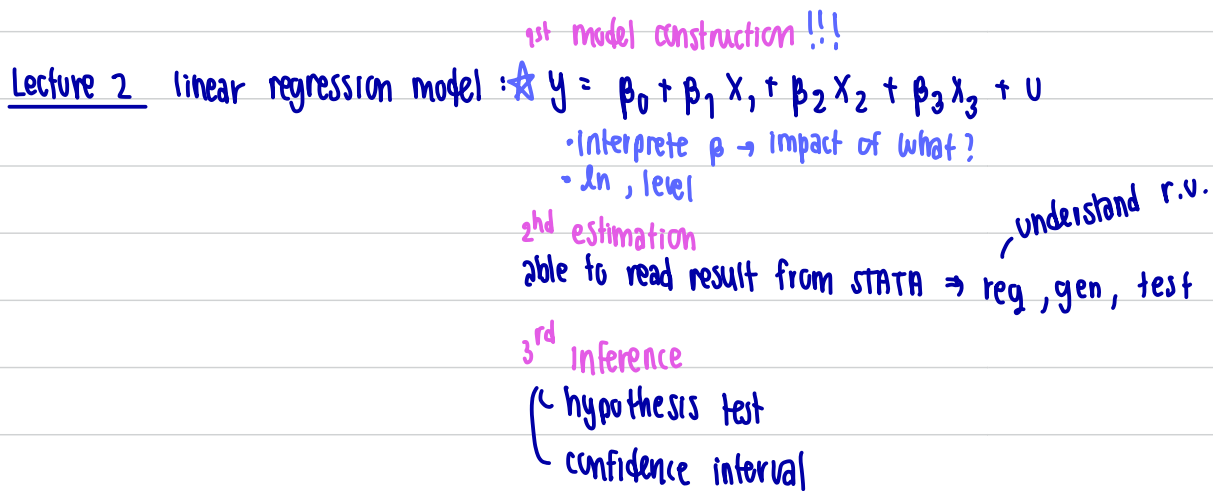
given 1-side-test \rightarrow can you do 2-side test

mean \sim 40-50% last yr



$$\text{var}(ax+by)$$

$$\text{var}[X+Y] = \text{var}[X] + \text{var}[Y] + 2\text{Cov}(X,Y)$$



Rescale

Goodness of fit: no need to remember formula