Lab:

* Matt go over 2015 Comp Exam Q1

* Adding curve to histograms

  (also $\frac{\hat{\sigma}^2}{\sigma^2} n-p \sim \chi^2_{n-p}$)

In class:

2 * Interpretation of parameters 17

$\hat{\sigma}^2$? F-test result

4 * Midterm 2(b) – independance / orthogonality etc. 8

7 * HW #3 $Y = X\beta + Z\gamma + \varepsilon$? 4

3 * Simultaneous CI for subset of parameters 12

5 * Prediction – CI for mean

– PI for obs. 7

6 * CI on linear combination – different one 7

1 * F-test <u>RSS</u> given? Solve for it? 20

RSS :

$$\text{F-stat} = \frac{(RSS_\omega - RSS_\Omega)/(p-q)}{RSS_\Omega / n-p}$$

The RSS is ________ M1

________ M2

Regression ANOVA

Total SS

Regression SS

$\boxed{\boxed{\text{Residual SS}} = \text{Total SS} - \text{Regression SS}}$

$\hat{\sigma}$, $\hat{\sigma}^2$

a multiple of sample variance of y_i's

$$\boxed{\hat{\sigma}^2 = \frac{RSS}{n-p}}$$

$$\text{sample variance} = \underbrace{\frac{\sum_{i=1}^{n}(y_i - \bar{y})^2}{n-1} = \frac{TSS}{n-1}}_{\text{rare}}$$

$$\hat{\sigma} = \sqrt{\frac{RSS}{n-p}}$$

in R output

\# parameters in corresponding model

Asked to find F-stat . . . .

$$\boxed{\begin{array}{c} H_0: \beta_j = 0 \\ F = t^2 \text{ in the single parameter case} \end{array}}$$

2 Interpretation of parameters

$\hat{\sigma}^2$

$\hat{\sigma}$ – same units as response

estimate of σ – s.d. of our errors

– s.d. of the deviations from the mean line.

" spread of data around model for mean "

Y_i = \$ spent on gambling

$\hat{\sigma}$ = \$22

Assumption of Normality : 95% $\varepsilon_i \in (-\$44, \$44)$

Roughly, we expect 95% of teens to be within ~~\$44~~ \$44 of the mean.

Chebychev $1 - \frac{1}{k\sigma}$

$$P(|X - \mu| \geq k\sigma) \leq \frac{1}{k^2}$$

$$P(|X-\mu| \geq 2\sigma) \leq \frac{1}{4}$$

at ~~most~~ ~~in~~ least $\geq$ 75% of teens ~~the~~ are within ± $44 from ~~the~~ mean based on ~~the~~ a model that includes . . . .

expected value based on ...covariates

F-test results

$$Y_i = \beta_0 + \underbrace{\beta_1 x_{1i}}_{\text{mothers height}} + \underbrace{\beta_2 x_{2i}}_{\text{fathers height}} + \underbrace{\beta_3 x_{3i}}_{\text{gender}} + \varepsilon_i$$

$$H_0: \beta_1 = \beta_2$$

Decision is reject null

There is convincing the effect of father's height is not the same as the effect of mothers height, after accounting for

null

~~by~~ gender.

Interpret the intercept, β_0?

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \varepsilon_i$$

$$E\left[y_i \,\middle|\, \text{all covariates are zero}\right] = \beta_0$$

mean

β_0 is the expected response when all covariates are zero.

$$y_i = \beta_0 + \beta_1 \overbrace{(x_{1i} - \bar{x}_1)}^{=0} + \beta_2 \overbrace{(x_{2i} - \bar{x}_2)}^{=0} + \varepsilon_i$$

sample mean of covariate 1

age

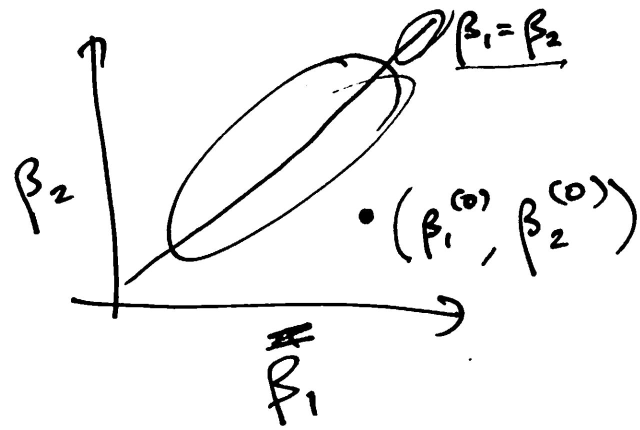
centered covariates:

β_0 is the mean response when all covariates are at their "average" value.

③ Simultaneous CI's

You do not have to know how to calculate.

~~Reta~~ You do have to know the relationship between CI and F-test.



would I accept or reject $H_0: (\beta_1, \beta_2) = (\beta_1^{(0)}, \beta_2^{(0)})$ at the 5% level