- Hw 2 tomorrow
- last Wednesday: cubic regression splines
  natural cubic splines

$p=1$, one X predictor
overall relationship between X and Y

Degrees of Freedom

t-test $t = \frac{\bar{X}-\mu}{s/\sqrt{n}} \sim t_{n-1}$

Given we have $\bar{X}$ we can vary $n-1$ of the samples to get $\bar{X}$

$n=4$, $\bar{X}=10$

$X_1 = 5$, $X_2 = 15$, $X_3 = 40$

to make this $\bar{X}=10$,

$\Rightarrow X_4 = -20$

degrees of freedom of a model
= # of things we estimate

$Y = \beta_0 + \beta_1 X + \varepsilon \Rightarrow$ df of model $= 2$

cubic spline with K knots $\rightarrow$ df $= K+3$

natural cubic spline K knots $\rightarrow$ df $= K+1$

df $\approx$ "flexibility" of model

df is a bias / variance trade-off

LS with p predictors

$\hookrightarrow$ $p+1$ df

Ridge / LASSO

$< p+1$ df

shrinkage = reducing df