Quirks of lht()

In the last video, we discussed the use of lht() funciton in R. However, as we saw, R used the convention that α_1 is zero. It does that because all the parameters are not estimable. So when we do Hypothesis Testing in this setup, we must be careful about the interpretation.

```
> library(faraway)
> library(car)
> names(coagulation)
[1] "coag" "diet"
> fit=lm(coag~diet,coagulation)
> fit

Call:
lm(formula = coag ~ diet, data = coagulation)

Coefficients:
(Intercept)        dietB        dietC        dietD
  6.100e+01    5.000e+00    7.000e+00    2.991e-15

> lht(fit, 'dietB')
Linear hypothesis test

Hypothesis:
dietB = 0

Model 1: restricted model
Model 2: coag ~ diet

  Res.Df RSS Df Sum of Sq      F   Pr(>F)
1     21 172
2     20 112  1        60 10.714 0.003803 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

In the above code, we did the test for $\alpha_1 = \alpha_2$, using the command

```
lht(fit, 'dietB')
```

. Note that we had to use the name "dietB" since these are the parameter names specified by R.
Since R has already taken $\alpha_1 = 0$, we must therefore do the test for $\alpha_2 = 0$ here. Note that it is meaningless to do the test in general since α_2 is not estimable, but since R has already made $\alpha_1 = 0$, this is alright. It's just that the syntax is a bit confusing.
Doing the test, we notice that all the results are fine

```
Model 1: restricted model
Model 2: coag ~ diet

  Res.Df RSS Df Sum of Sq      F   Pr(>F)
1     21 172
2     20 112  1        60 10.714 0.003803 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

This is infact the correct test for $\alpha_1 = \alpha_2$. We see that the p-value is 0.003803 so we reject the Null Hypothesis at 0.05 level of significance.