```
> #c
> #i
> full <- lm(formula = fare ~ pass + lead_rate + pass:lead_rate, data = air)
> summary(full)

Call:
lm(formula = fare ~ pass + lead_rate + pass:lead_rate, data = air)

Residuals:
    Min      1Q  Median      3Q     Max
-110.033  -39.693   -6.095   34.136  238.506

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)       179.218715   3.869816  46.312  < 2e-16 ***
pass               -0.008580   0.003796  -2.260 0.024020 *
lead_ratemed      -18.557697   5.621994  -3.301 0.000998 ***
lead_ratehigh     -11.649593   5.525067  -2.108 0.035238 *
pass:lead_ratemed   0.010739   0.005633   1.906 0.056896 .
pass:lead_ratehigh  -0.008725   0.005323  -1.639 0.101517
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 54.25 on 994 degrees of freedom
Multiple R-squared:  0.04482,           Adjusted R-squared:  0.04002
F-statistic: 9.329 on 5 and 994 DF,  p-value: 1.068e-08

> red <- lm(formula = fare ~ pass + lead_rate, data = air)
> summary(red)

Call:
lm(formula = fare ~ pass + lead_rate, data = air)

Residuals:
    Min      1Q  Median      3Q     Max
-106.113  -41.524   -5.673   34.594  241.456

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  179.238861   3.397291  52.759  < 2e-16 ***
pass          -0.008613   0.002254  -3.822 0.000141 ***
lead_ratemed  -11.234245   4.278886  -2.626 0.008785 **
lead_ratehigh -17.873542   4.267450  -4.188 3.06e-05 ***
---
```

```
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 54.52 on 996 degrees of freedom
Multiple R-squared:  0.03318,           Adjusted R-squared:  0.03026
F-statistic: 11.39 on 3 and 996 DF,  p-value: 2.382e-07

> fobs <- (sum(residuals(red)^2) - sum(residuals(full)^2))/(red$df -
full$df)/(sum(residuals(full)^2)/full$df)
> fobs
[1] 6.061017
> p <- pf(fobs,df1=(red$df-full$df),df2=full$df,lower.tail = FALSE)
> p
                                    [1] 0.002419107
```

```
> #ii
> anova(mred,m_full)
Analysis of Variance Table

Model 1: fare ~ pass + lead_rate
Model 2: fare ~ pass + lead_rate + pass:lead_rate
  Res.Df     RSS Df Sum of Sq     F   Pr(>F)
1    996 2960675
2    994 2925004  2     35671 6.061 0.002419 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

The answer is SAME!