Midterm Q7

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```
library(AER)
```

```
## Loading required package: car
```

```
## Loading required package: carData
```

```
## Loading required package: lmtest
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: sandwich
```

```
## Loading required package: survival
```

```
data("Affairs")
```

7. Comparing models.

a. Fit a small model g.sm affairs ~ age + yearsmarried + religiousness + occupation + rating. What are the model coefficients?

```
g.sm=lm(affairs ~ age + yearsmarried + religiousness + occupation + rating,data=Affairs)
g=lm (affairs~gender+age+yearsmarried+children+education+religiousness+occupation+rating, data = Affairs)


summary(g.sm)
```

```
##
## Call:
## lm(formula = affairs ~ age + yearsmarried + religiousness + occupation +
##     rating, data = Affairs)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -5.0382 -1.7076 -0.7780  0.2086 12.8134
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    5.60816    0.79660   7.040 5.31e-12 ***
## age           -0.05035    0.02211  -2.278   0.0231 *
## yearsmarried   0.16185    0.03690   4.387 1.36e-05 ***
## religiousness -0.47632    0.11131  -4.279 2.18e-05 ***
## occupation     0.10601    0.07110   1.491   0.1365
## rating        -0.71224    0.11829  -6.021 3.03e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.087 on 595 degrees of freedom
## Multiple R-squared:  0.1314, Adjusted R-squared:  0.1241
## F-statistic:    18 on 5 and 595 DF,  p-value: < 2.2e-16
```

```
coef(g.sm)
```

```
##   (Intercept)           age  yearsmarried religiousness    occupation
##    5.60816061   -0.05034735    0.16185208   -0.47632388    0.10600594
##        rating
##   -0.71224235
```

b. In comparing g with g.sm, what are the null and alternative hypotheses for this statistical test?

```
#H0= beta_gender=0, beta_children=0, beta_education=0
#H1= Atleast one beta_gender, beta_children, beta_education not equal to 0
```

c. Compute the Analysis of Variance table for this test based on the data?

```
g0 <- lm(affairs~1, Affairs)
(anov <- anova(g0, g.sm))
```

```
## Analysis of Variance Table
##
## Model 1: affairs ~ 1
## Model 2: affairs ~ age + yearsmarried + religiousness + occupation + rating
##   Res.Df    RSS Df Sum of Sq      F    Pr(>F)
## 1    600 6529.1
## 2    595 5671.1  5    857.99 18.004 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
data.frame(tab7 <- anova(g,g.sm))
```

```
##   Res.Df      RSS Df Sum.of.Sq          F    Pr..F.
## 1    592 5668.953 NA        NA         NA        NA
## 2    595 5671.094 -3 -2.140682 0.07451603 0.9736765
```

d. Using α=0.05. What is the conclusion of the hypotheses test of g.sm versus g?

```
p_value= 0.9736765
#Conclusion: p-value is large, greater than alpha = 0.05, therefore accept the small model.
```