Assignment 4 solution

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### setup

library(readxl)  
library(jtools)  
# using the "readxl" package to load the .xlsx data file  
data <- read\_excel("./TV.xlsx")  
#View(data)

### Question 1

A. Estimate a quadratic regression model where the GPA of middle school children is regressed on hours and hours-squared.

ols1 <- lm(GPA~Hours+I(Hours^2), data=data)  
summary(ols1)

##   
## Call:  
## lm(formula = GPA ~ Hours + I(Hours^2), data = data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.48261 -0.11259 0.06073 0.14251 0.43845   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 3.0944928 0.2023129 15.296 7.09e-14 \*\*\*  
## Hours 0.0409976 0.0227527 1.802 0.084141 .   
## I(Hours^2) -0.0021909 0.0005725 -3.827 0.000814 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.2323 on 24 degrees of freedom  
## Multiple R-squared: 0.7912, Adjusted R-squared: 0.7737   
## F-statistic: 45.46 on 2 and 24 DF, p-value: 6.886e-09

### Question 3

B. Find the optimal number of weekly hours of TV for middle school children.

# retrieving the coefs from the last ols to use as numerics  
beta1 <- coef(ols1)[2]  
beta2 <- coef(ols1)[3]  
  
# Formula to maximize GPA  
max\_hours <- beta1/(beta2\*2) \* -1  
max\_hours

## Hours   
## 9.356458