Homework 9

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2023-12-06

# Question T

## A

Suitable Dummy variable is agar soil (f) = 1, ashed soil (m)= 0

dataFor9 <- read.csv("dataForHW9.csv")  
fullModel <- lm(Y~X+G+I(G\*X), data= dataFor9,)  
summary(fullModel)

##   
## Call:  
## lm(formula = Y ~ X + G + I(G \* X), data = dataFor9)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.6598 -0.1035 0.0171 0.2567 0.4125   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.605607 0.575818 1.052 0.315   
## X 0.070944 0.009999 7.095 2.01e-05 \*\*\*  
## G 3.912614 0.658188 5.945 9.67e-05 \*\*\*  
## I(G \* X) -0.018635 0.013458 -1.385 0.194   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.3456 on 11 degrees of freedom  
## Multiple R-squared: 0.9389, Adjusted R-squared: 0.9222   
## F-statistic: 56.3 on 3 and 11 DF, p-value: 5.808e-07

Full model is:   
Fitted equation for the full model is:   
   
Fitted Line for male(0):  
   
Fitted line for female(1):

## B

Are the two lines parallel?

2. Test stat t test:   
    = -1.188, p-value = 0.260
3. With a p value of 0.260 > 0.05 we fail to reject the null hypothesis at the 0.05 significance level. The data does not prove the lines are not parallel.

## C

Are the two straight lines coincident/

reducedModel <- lm(Y~X, data = dataFor9)  
anova(reducedModel, fullModel)

## Analysis of Variance Table  
##   
## Model 1: Y ~ X  
## Model 2: Y ~ X + G + I(G \* X)  
## Res.Df RSS Df Sum of Sq F Pr(>F)   
## 1 13 21.364   
## 2 11 1.314 2 20.05 83.924 2.183e-07 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

1. At least one
2. Test state F Test: F =   
   = 93.686, p-value =
3. Since the p-value < 0.05 = We can reject the null hypothesis at the 0.05 significance level. The data suggests that there is a difference in cultured gametophytes when using the agar and ashed soils.

## D

maleData <- readxl::read\_xls("DataForHW9.xls", sheet= 2)  
femaleData <- readxl::read\_xls("DataForHW9.xls", sheet= 3)  
maleModel <- lm(Y~X, data= maleData)  
femaleModel <- lm(Y~X, data= femaleData)  
summary(maleModel)

##   
## Call:  
## lm(formula = Y ~ X, data = maleData)  
##   
## Residuals:  
## 1 2 3 4 5 6   
## -0.443381 0.214730 0.301897 -0.004157 -0.142656 0.073567   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.605607 0.499548 1.212 0.29210   
## X 0.070944 0.008674 8.179 0.00122 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.2998 on 4 degrees of freedom  
## Multiple R-squared: 0.9436, Adjusted R-squared: 0.9295   
## F-statistic: 66.89 on 1 and 4 DF, p-value: 0.001217

summary(femaleModel)

##   
## Call:  
## lm(formula = Y ~ X, data = femaleData)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.65980 -0.06442 0.01710 0.29863 0.41248   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 4.518222 0.340607 13.265 3.24e-06 \*\*\*  
## X 0.052310 0.009624 5.435 0.000971 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.3692 on 7 degrees of freedom  
## Multiple R-squared: 0.8084, Adjusted R-squared: 0.7811   
## F-statistic: 29.54 on 1 and 7 DF, p-value: 0.0009711

Fitted lines from A: Male: Female

Fitted Lines from D: Male: Female:

The Fitted Lines are the same whether they are in their own regression or the regression with the dummy variable.