Group Project #3

library(readr)  
SleepStudy <- read\_csv("https://raw.githubusercontent.com/JA-McLean/STOR455/master/data/SleepStudy.csv")

## Rows: 253 Columns: 27

## -- Column specification --------------------------------------------------------  
## Delimiter: ","  
## chr (5): LarkOwl, DepressionStatus, AnxietyStatus, Stress, AlcoholUse  
## dbl (22): Gender, ClassYear, NumEarlyClass, EarlyClass, GPA, ClassesMissed, ...

##   
## i Use `spec()` to retrieve the full column specification for this data.  
## i Specify the column types or set `show\_col\_types = FALSE` to quiet this message.

head(SleepStudy)

## # A tibble: 6 x 27  
## Gender ClassYear LarkOwl NumEarlyClass EarlyClass GPA ClassesMissed  
## <dbl> <dbl> <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 0 4 Neither 0 0 3.6 0  
## 2 0 4 Neither 2 1 3.24 0  
## 3 0 4 Owl 0 0 2.97 12  
## 4 0 1 Lark 5 1 3.76 0  
## 5 0 4 Owl 0 0 3.2 4  
## 6 1 4 Neither 0 0 3.5 0  
## # ... with 20 more variables: CognitionZscore <dbl>, PoorSleepQuality <dbl>,  
## # DepressionScore <dbl>, AnxietyScore <dbl>, StressScore <dbl>,  
## # DepressionStatus <chr>, AnxietyStatus <chr>, Stress <chr>, DASScore <dbl>,  
## # Happiness <dbl>, AlcoholUse <chr>, Drinks <dbl>, WeekdayBed <dbl>,  
## # WeekdayRise <dbl>, WeekdaySleep <dbl>, WeekendBed <dbl>, WeekendRise <dbl>,  
## # WeekendSleep <dbl>, AverageSleep <dbl>, AllNighter <dbl>

1. Construct a logistic model to predict the *Stress* of a student using *GPA*, *AverageSleep*, and *ClassYear* as the predictor variable.

mod1 = glm(factor(Stress) ~ GPA + AverageSleep + ClassYear, data = SleepStudy, family = binomial)  
summary(mod1)

##   
## Call:  
## glm(formula = factor(Stress) ~ GPA + AverageSleep + ClassYear,   
## family = binomial, data = SleepStudy)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -2.1843 0.4386 0.6356 0.7592 1.0841   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 5.64974 2.10371 2.686 0.00724 \*\*  
## GPA -1.15547 0.42717 -2.705 0.00683 \*\*  
## AverageSleep -0.01023 0.16400 -0.062 0.95026   
## ClassYear -0.20183 0.14690 -1.374 0.16946   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 267.47 on 252 degrees of freedom  
## Residual deviance: 258.64 on 249 degrees of freedom  
## AIC: 266.64  
##   
## Number of Fisher Scoring iterations: 4

1. For a sophomore student that has a 3.50 GPA, gets an average of 8 hours of sleep a night, what does your model predict is their stress level? Interpret.

'The student has a 0.75 chance of having a high level of stress.'

## [1] "The student has a 0.75 chance of having a high level of stress."

student = data.frame(GPA = 3.50, AverageSleep = 8, ClassYear = 2)  
predict(mod1, student, type="response")

## 1   
## 0.7540053

1. Construct a second logistic model to predict the *Stress* of a student using *GPA*, *AverageSleep*, and *ClassYear* as well as the interaction between *GPA* and *ClassYear* as the predictor variable.

mod2 = glm(factor(Stress) ~ GPA + AverageSleep + ClassYear + GPA\*ClassYear, data = SleepStudy, family = binomial)  
summary(mod2)

##   
## Call:  
## glm(formula = factor(Stress) ~ GPA + AverageSleep + ClassYear +   
## GPA \* ClassYear, family = binomial, data = SleepStudy)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -2.2103 0.4257 0.6382 0.7649 1.0378   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 6.72521 3.89996 1.724 0.0846 .  
## GPA -1.47051 1.05151 -1.398 0.1620   
## AverageSleep -0.00903 0.16423 -0.055 0.9562   
## ClassYear -0.63892 1.33515 -0.479 0.6323   
## GPA:ClassYear 0.12824 0.38933 0.329 0.7419   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 267.47 on 252 degrees of freedom  
## Residual deviance: 258.53 on 248 degrees of freedom  
## AIC: 268.53  
##   
## Number of Fisher Scoring iterations: 4