Midterm Exam: Part 2 (Programming)

Started: Mar 7 at 4:20pm

Quiz Instructions

Midterm Part 2 covers the topics in **Weeks 1, 2, 3, 4, 5, 6, 7 and 8** and is worth **15% of your overall grade**. You may work on it for as long as you like within the given window. Please note that your answers will automatically save as you key them. As long as you do not click submit, you can enter and exit the assignment as many times as necessary during the time period that it is available. Again, please note, **you should only click "submit" when you are completely finished with the assignment and ready to submit it for grading**.

Also, please remember that you are to complete this exam on your own. Any help given or received constitutes cheating. **Any violations of the Georgia Tech Honor Code will be reported and penalized.** If you have any general questions about the exam, please post to the Piazza board marking it private.

Good luck!

Instructions for Q1-Q5

Load dataset **"College"** from Package "ISLR" in R.

Question 1 — 1 pts

Estimate a linear regression model (using the lm function) with Personal as the dependent variable and Room.Board as the independent variable. What are the model's R-squared and adjusted R-squared values?

- ○ 0.00549, 0.048
- ○ 0.0143, 0.022
- ◉ 0.0398, 0.0385

- ○ 0.0325, 0.0336

Question 2

1 pts

Based on the linear-linear regression model in the previous question (with Personal as the dependent variable and Room.Board as the independent variable), fit three nonlinear models using those two variables. Based on their adjusted R-squared values, which one of the four models is most appropriate to use?

- ○ Log-Linear
- ◉ Log-Log
- ○ Linear-Linear
- ○ Linear-Log

Question 3

1 pts

Interpret the coefficient of the independent variable for the Linear-Log model.

- ○ 1% increase in Room.Board leads to 536.36 units decrease in Personal
- ○ 1 unit increase in Room.Board leads to 536.36 units decrease in Personal
- ○ 1 unit increase in Room.Board leads to 0.01*536.36 units decrease in Personal
- ◉ 1% increase in Room.Board leads to 0.01*536.36 units decrease in Personal

Question 4

1 pts

Interpret the coefficient of the independent variable for the Log-Linear model. (E-05=10^-5)

- ○ 1% increase in Room.Board leads to e^(9.187E^-05) units decrease in Personal
- ◉ 1 unit increase in Room.Board leads to (e^(9.187E^-05)-1) * 100% decrease in Personal
- ○ 1 unit increase in Room.Board leads to e^(9.187E^-07) units decrease in Personal
- ○ 1% increase in Room.Board leads to e^(9.187E^-05) * 100% decrease in Personal

Question 5

1 pts

Interpret the coefficient of the independent variable for the Log-Log model.

- ○ 1% increase in Room.Board leads to (e^(0.0040568)-1)*100% decrease in Personal
- ○ 1 unit increase in Room.Board leads to 0.40568*100% decrease in Personal
- ○ 1 unit increase in Room.Board leads to (e^0.40568)*100% decrease in Personal
- ◉ 1% increase in Room.Board leads to 0.40568% increase in Personal

Instructions for Q6-10

Imagine you are interested in knowing how variables like GRE (Graduate Record Exam scores), GPA (Grade Point Average) etc affect admission into graduate school. The response variable, **"admit"** (admit/don't admit), is a binary variable. Create a logistic regression model using the dataset **binary.csv (https://www.dropbox.com/s/txg9spn5rabibdf/binary.csv?dl=0)** . Use the information from the model to answer the following five questions. Select the closest answer.

Question 6

1 pts

How to interpret the coefficient of gre?

- ○ If gre increases by 1 unit, the natural log of the odds of admission increases by 0.003.
- ○ If gre increases by 1 unit, the odds of admission increase by a factor of exp(0.003).
- ○ If gre increases by 1 unit, the odds of admission increase by roughly 100*0.003 percent.
- ◉ All of the above.

Question 7

1 pts

How to interpret the coefficient of gpa?

- ◉ If gpa increases by 1 unit, the natural log of the odds of admission increases by 0.755.
- ○ If gpa increases by 1 unit, the odds of admission increase by 0.755.
- ○ If gpa increases by 1 unit, the odds of admission increase by 10^(0.755).
- ○ All of the above.

Question 8

1 pts

A student has the GPA of 3.5 and GRE score of 330. What is the predicted probability of this student getting admitted into graduate school?

- ○ A. exp(-4.949 + 0.003*3.5 + 0.755*330)/[1 + exp(-4.949 + 0.003*3.5 + 0.755*330)]
- ◉ B. exp(-4.949 + 0.003*330 + 0.755*3.5)/[1 + exp(-4.949 + 0.003*330 + 0.755*3.5)]
- ○ C. [1 - exp(-4.949 + 0.003*330 + 0.755*3.5)]/[1 + exp(-4.949 + 0.003*330 + 0.755*3.5)]
- ○ D. [1 - exp(-4.949 + 0.003*330 + 0.755*3.5)]/exp(-4.949 + 0.003*330 + 0.755*3.5)

Question 9

1 pts

If a student has a GRE score of 330, with 0.1 unit increase in GPA, what is the change of the natural log of predicted odds of this student getting admitted into graduate school?

- ○ exp(-4.949 + 0.003*0.1 + 0.755*330)/[1 + exp(-4.949 + 0.003*0.1 + 0.755*330)]
- ○ exp(-4.949 + 0.003*0.1 + 0.755*330)
- ◉ 0.0755
- ○ None of the above

Question 10

1 pts

What is the value of area under the curve (AUC) for the model created? Please select the closest answer.

- ○ 0.804
- ○ 0.935
- ◉ 0.635
- ○ 0.832

Instructions for Q11-Q15

Use the dataset **Berkshire.csv (https://www.dropbox.com/s/plo0hc4t008s0xq/Berkshire.csv?dl=0)** with the following variables.

- Column (1): *Date*, Calendar Date
- Column (2): *BRKret*, Berkshire Hathaway's monthly return
- Column (3): *MKT*, the return on the aggregate stock market
- Column (4): *RF*, the risk free rate of return

Question 11

1 pts

What is the standard deviation of Berkshire Hathaway over the sample period?

- (●) 6.75%
- ( ) 6.81%
- ( ) 6.86%
- ( ) 6.90%

Question 12

1 pts

What is Berkshire Hathaway's average return over the sample period? (Select the closest)

- ( ) 1.5%
- (●) 1.9%
- ( ) 2.3%
- ( ) 2.7%

Question 13

1 pts

Relative to the aggregate market, Berkshire Hathaway has:

- ( ) Underperformed the market
- ( ) Outperformed the market by 0.25% to 0.50% per month on average
- (●) Outperformed the market by greater than 0.75% per month on average

Question 14

1 pts

$10,000 invested in Berkshire Hathaway at the start of the sample period would have grown to _____ by the end of the sample period

- ○ $900,000
- ○ $10,000,000
- ○ $25,000,000
- ◉ Over $30,000,000

Question 15

1 pts

What is Berkshire Hathaway's monthly Sharpe ratio?

- ○ 0.10
- ○ 0.55
- ○ 0.80
- ◉ 0.23

Question 16

1 pts

Berkshire Hathaway's Sharpe Ratio is _____ than the aggregate stock market?

- ◉ Higher
- ○ Lower

Instructions for Q17-18

In this question, we will determine the factors explaining the returns for the HiTec industry portfolio.

We will build a factor regression model using the data in the **Factor_HiTech.csv (https://www.dropbox.com/s/cgzx76amshdr8yl/Factor_HiTec.csv?dl=0)** file to answer the questions below.

In the file, the following factor values are provided:

- Mkt_rf: Monthly excess return on the aggregate stock market
- RF: Risk-Free rate
- SMB: Size Factor
- HML: Value Factor
- QMJ: Quality Factor
- BAB: Betting against beta factor
- Mom: Momentum factor
- HiTec: Monthly return on the HiTec industry portfolio

Question 17

1 pts

Which factors have the highest positive and highest negative exposure on the portfolio respectively?

- ○ Mom and SMB
- ○ HML and Mkt_rf
- ○ SMB and BAB
- ◉ Mkt_rf and HML
- ○ BAB and QMJ

Question 18

1 pts

Given a significance level of 0.001, which factor could be removed from this model if we have to limit the number of features less than 6?

- (●) QMJ
- ( ) SMB
- ( ) HML
- ( ) BAB

Instructions for Q19-20

Use the data set **UPS_KO.csv (https://www.dropbox.com/s/vqil143rbd2b55m/UPS_KO.csv?dl=0)** file to answer the questions below.

In the file,

- Date: This column represents date from 09/2014 to 08/2019.
- Mkt_RF: This column represents market premium (i.e., Market return –
- risk_free rate).
- SMB: This column represents the value of the size factor.
- HML: This column represents the value of the value factor.
- RF: This column represents risk free rate.
- UPS: This column represents the return of UPS.
- KO: This column represents the return of KO.

Estimate a three-factor model by regressing return in excess of the risk free rate on Mkt_rf; SMB; and HML for both UPS and KO

Question 19 1 pts

The coefficient of HML for the three factor model for UPS suggests that:

- ○ UPS is tilted towards small cap stocks
- ○ UPS is tilted towards large cap stocks
- ◉ UPS is tilted towards value stocks
- ○ UPS is tilted towards growth stocks

Question 20

1 pts

Based on their three factor model, which firm has a higher level of performance? What is this firm's return (performance level)?

- ○ UPS, 0.06% per month
- ○ UPS, 0.09% per month
- ◉ KO, 0.2 % per month
- ○ KO, 0.2% per year

Quiz saved at 10:40pm

Submit Quiz