Regression Analysis

Started: Apr 17 at 3:16pm

Quiz Instructions

Question 1 — 0.5 pts

For a regression equation $\hat{y} = b_0 + b_1 x_1 + b_2 x_2$. The meaning of the slope is the change in $\hat{y}$ for each unit change in x_i.

- (●) True
- ( ) False

Question 2 — 0.38 pts

For a regression equation $\hat{y} = b_0 + b_1 x_1 + b_2 x_2$. The meaning of the slope is the change in x_i for each unit change in $\hat{y}$.

- ( ) True
- (●) False

Question 3 — 0.38 pts

Residuals are supposed to be distributed...

- ( ) Poisson
- (●) Gaussian
- ( ) Student's t

- ○ Binomial

Question 4

0.38 pts

In a correlation matrix, the diagonal is supposed to be...

- ◉ all ones
- ○ all zeros
- ○ the variance between the corresponding variables
- ○ the variance of the variable

Question 5

0.38 pts

In the model: $\hat{Min.Price} = 4.21 + 0.14Horsepower + 0.54Wheelbase$

if Horsepower increases in one unit...

- ◉ Min.price increases in $0.14 times 1,000
- ○ Min.price decreases in $0.14 times 1,000
- ○ Min.price increases in $0.14
- ○ Horsepower increases in $0.14 times 1,000

Question 6

0.38 pts

In the model: $\hat{Min.Price} = 4.21 + 0.14Horsepower - 0.92width$

if width increases in one unit...

- (●) Min.price decreases in $0.92 times 1,000
- ( ) Min.price icreases in $0.92 times 1,000
- ( ) Width decreases in $0.92 times 1,000
- ( ) Width increases in $0.92 times 1,000

Question 7

0.38 pts

In a model to predict Horsepower based on engine size...

```
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   45.219     10.312   4.385 3.11e-05 ***
## EngineSize    36.963      3.605  10.253  < 2e-16 ***
```

- ( ) at the 0.01 level of significance, the evidence suggests that the slope of Horsepower is not different from zero.
- ( ) at the 0.01 level of significance, the evidence suggests that the slope of EngineSize is not different from zero.
- (●) at the 0.01 level of significance, the evidence suggests that the slope of EngineSize is different from zero.
- ( ) at the 0.01 level of significance, the evidence suggests that the slope of Horsepower is different from zero.

Question 8

0.38 pts

In a model to predict Horsepower based on engine size...

```
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   45.219     10.312   4.385 3.11e-05 ***
## EngineSize    36.963      3.605  10.253  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 35.87 on 91 degrees of freedom
## Multiple R-squared:  0.536,  Adjusted R-squared:  0.5309
## F-statistic: 105.1 on 1 and 91 DF,  p-value: < 2.2e-16
```

- ○ by the Residual standard error, the model explains 35.87% of the variability in Horsepower
- ○ by the R^2, the model explains 53.6% of the variability in EngineSize
- ○ by the slope, the model explains 36.96% of the variability in EngineSize
- ◉ by the R^2, the model explains 53.6% of the variability in Horsepower

Question 9

0.38 pts

The goodness of fit of a linear model can be evaluated using the residual standard error and R^2.

- ◉ True
- ○ False

Question 10

0.38 pts

The goodness of fit of a linear model can be evaluated using the slope and the F-statistics.

- ◉ True
- ○ False

Question 11

0.38 pts

The null hypothesis for the slope for EngineSize is...

```
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    -3.0892     2.5419  -1.215    0.227
## EngineSize      7.0637     0.7617   9.274 9.24e-15 ***
## Originnon-USA   7.7596     1.5725   4.935 3.66e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 6.948 on 90 degrees of freedom
## Multiple R-squared:  0.4939, Adjusted R-squared:  0.4826
## F-statistic: 43.91 on 2 and 90 DF,  p-value: 4.925e-14
```

- (●) $H_0 : \beta_{EngineSize} = 0$
- ( ) $H_0 : \beta_{EngineSize} \geq 0$
- ( ) $H_0 : \beta_{EngineSize} \leq 0$
- ( ) $H_0 : \beta_{EngineSize} \neq 0$

Question 12

0.38 pts

When inflation is high, lenders require higher interest rates to make up for the loss of purchasing power of their money while it is loaned out. An inflation rate of 5% means that the same set of goods and services costs 5% more. The data cover years, from 2004 to 2008.

Year	TBILL	INFLATION
2004	1.58	3.26
2005	3.39	3.42
2006	4.81	2.54
2007	4.44	4.08
2008	1.62	0.09

Run a regression analysis to create a model to estimate T-Bill return using the inflation rate as a predictor.

What is the proportion of the variability in the T-Bill return explained by the Inflation rate, according to the linear model? ____ %

- ○ 10.26
- ○ 0
- ○ 38.04
- ◉ 25.97

Question 13

0.38 pts

When inflation is high, lenders require higher interest rates to make up for the loss of purchasing power of their money while it is loaned out. An inflation rate of 5% means that the same set of goods and services costs 5% more. The data cover years, from 2004 to 2008.

Year	TBILL	INFLATION
2004	1.58	3.26
2005	3.39	3.42
2006	4.81	2.54
2007	4.44	4.08
2008	1.62	0.09

Run a regression analysis to create a model to estimate T-Bill return using the inflation rate as a predictor.

What is the t-value used to test the slope coefficient)? ____

- ◉ 1.026
- ○ 25.97
- ○ 10.26
- ○ 38.04

Question 14

0.38 pts

When inflation is high, lenders require higher interest rates to make up for the loss of purchasing power of their money while it is loaned out. An inflation rate of 5% means that the same set of goods and services costs 5% more. The data cover years, from 2004 to 2008.

Year	TBILL	INFLATION
2004	1.58	3.26
2005	3.39	3.42
2006	4.81	2.54
2007	4.44	4.08
2008	1.62	0.09

Run a regression analysis to create a model to estimate T-Bill return using the inflation rate as a predictor.

What is the p-value for the test of the slope? ____

- (●) 0.3804
- ( ) 10.26
- ( ) 38.04
- ( ) 25.97

Question 15

0.38 pts

When inflation is high, lenders require higher interest rates to make up for the loss of purchasing power of their money while it is loaned out. An inflation rate of 5% means that the same set of goods and services costs 5% more. The data cover years, from 2004 to 2008.

Year	TBILL	INFLATION
2004	1.58	3.26
2005	3.39	3.42
2006	4.81	2.54
2007	4.44	4.08
2008	1.62	0.09

Run a regression analysis to create a model to estimate T-Bill return using the inflation rate as a predictor.

What is the proportion of the variability in the T-Bill return explained by the Inflation rate, according to the linear model? ____ % (round to 2 decimal places)

At the 0.10 level of significance, is there evidence of a linear relationship between T-Bill return and inflation rate?

- ○ yes, there is evidence suggesting a linear relationship between T-Bill return and inflation rate
- ◉ no, there is no evidence suggesting a linear relationship between T-Bill return and inflation rate

Question 16

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in

thousands of $). Determine the model and estimate the regression line.

The value of the standard error of the estimate of price is: ____

- (●) 12.40
- ( ) 0.0732
- ( ) 29.67
- ( ) 0.8078

Question 17

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model and estimate the regression line.

The value of the coefficient of determination is: ____

- ( ) about 12.40%
- (●) about 80.78%
- ( ) about 94.20%

○ about 56.22%

Question 18

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model and estimate the regression line.

The value of the y-intercept is ____

○ 38.04

○ 12.40

◉ 29.67

○ 0.0732

Question 19

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model and estimate the regression line.

The value of the slope coefficient is: ____

- ○ 29.67
- ◉ 0.0732
- ○ 12.40
- ○ 38.04

Question 20

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121

1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model and estimate the regression line.

What percentage of the variability in house prices is explained by this model: ____ %, approximately.

- ○ 12.40%
- ○ 29.67%
- ◉ 80.76%
- ○ 38.04%

Question 21

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model:

- (●) price = b0 + b1 area
- ( ) area = b1 price
- ( ) area = b0 + b1 price
- ( ) y = b0 + b1 area + price

Question 22

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model and estimate the regression line.

$H_0: \beta_1 = 0$

$Ha: \beta_1 \neq 0$

The degrees of freedom for this test are: ____

- ( ) 1

- ○ 0.0732
- ◉ 6
- ○ 5.0213

Question 23

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model and estimate the regression line.

H_0: $\beta_1 = 0$

Ha: $\beta_1 \neq 0$

The value of the test statistic is: ____

- ○ 6
- ○ 1
- ○ 0.0732
- ◉ 5.0213

Question 24

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model and estimate the regression line.

H_0: $\beta_1 = 0$

Ha: $\beta_1 \neq 0$

The p-value for the result of this test is: ____.

- ○ 6
- ◉ 0.0024
- ○ 5.0213
- ○ 1

Question 25

0.38 pts

The following data describes a random sample of 8 houses sold in a Midwest city during a recent year. We will examine the relationship between size and price.

Square Feet	Price
1897	172
1157	121
1024	107
935	85
1236	123
1248	106
1620	141
1124	132

Run a regression analysis using the area (squared feet) to explain the price (in thousands of $). Determine the model and estimate the regression line.

H_0: $\beta_1 = 0$

Ha: $\beta_1 \neq 0$

The 95% confidence interval for the slope is: [____, ____]

- ○ [0.0375, 0.0732]
- ○ [0.0732, 0.1089]
- ○ [-0.0375, -0.0732]
- ◉ [0.0375, 0.1089]

Question 26

0.38 pts

For the following model estimating Price (in thousands of $):

```
Modell=lm(Price~Horsepower+EngineSize+MPG.city+MPG.highway+Rev.per.mile+Man.trans.avail+
Fuel.tank.capacity+Passengers+Length+Wheelbase+Width+Turn.circle+Weight+Rear.seat.room+L
uggage.room+Origin+AirBags+Type+Cylinders+Weight+PRM)
summary(Modell)
```

```
Coefficients:
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)        81.335018  37.993697   2.141 0.036826 *
Horsepower          0.123535   0.049355   2.503 0.015372 *
EngineSize         -0.615828   3.047223  -0.202 0.840602
MPG.city           -0.392888   0.470385  -0.835 0.407259
MPG.highway         0.013646   0.428978   0.032 0.974740
Rev.per.mile        0.001498   0.002511   0.597 0.553206
Man.trans.availYes -1.600967   2.480497  -0.645 0.521387
Fuel.tank.capacity  0.462731   0.572169   0.809 0.422219
Passengers          0.615593   1.823089   0.338 0.736925
Length              0.074875   0.130511   0.574 0.568547
Wheelbase           0.740146   0.343760   2.153 0.035796 *
Width              -1.745792   0.571082  -3.057 0.003473 **
Turn.circle        -0.695287   0.415708  -1.673 0.100203
Weight             -0.004068   0.006255  -0.650 0.518171
Rear.seat.room      0.101150   0.420050   0.241 0.810619
Luggage.room        0.176183   0.367199   0.480 0.633306
Originnon-USA       1.881047   1.762845   1.067 0.290696
AirBagsDriver only -3.294049   1.888346  -1.744 0.086777 .
AirBagsNone        -8.535307   2.289737  -3.728 0.000464 ***
TypeLarge          -1.692122   3.999146  -0.423 0.673887
TypeMidsize         2.684947   2.639047   1.017 0.313504
TypeSmall           1.913341   2.896592   0.661 0.511710
TypeSporty          4.686129   3.268426   1.434 0.157407
Cylinders4         -3.126727   4.554852  -0.686 0.495360
Cylinders5         -4.732933   7.498898  -0.631 0.530605
Cylinders6          0.224795   5.695793   0.039 0.968664
Cylinders8          4.020677   7.255406   0.554 0.581755
RPM                -0.002778   0.002450  -1.134 0.261805
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 5.009 on 54 degrees of freedom
  (11 observations deleted due to missingness)
Multiple R-squared:  0.8313,    Adjusted R-squared:  0.747
F-statistic: 9.859 on 27 and 54 DF,  p-value: 1.014e-12
```

Assess the goodness of fit for this model...

- (●) The model explains about 83% of the variability in price and the typical deviation in a prediction is about $5,009.
- ( ) The model explains about 75% of the variability in price and the typical deviation in a prediction is about $5,009.

- ◯ The F-statistic: 9.859 with pvalue 1.014e-12 is indicative of a significant fit.
- ◯ With AirBagsNone, slope= -8.535307 and significant predictor with p-value= 0.000464 ***; this is a well fitting model.

Quiz saved at 5:22pm Submit Quiz