Question 1

L2R09TB-AC019-1512

LOS: LOS-5970

Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA

Difficulty: medium

An analyst believes that a stock has a beta equal to that of the market as a whole. He wishes to test this belief using a 0.01 level of significance. He takes a sample of 24 monthly returns for the stock and identifies that the sample beta is 0.6 with a standard error of 0.21. Using a student's *t*-distribution table, the critical value of *t* was determined to be 2.819 for a sample of this size and for this level of significance. The *t*-statistic for testing the null hypothesis that the stock's beta is equal to the market beta is *closest* to:

- 1.90, and at a 0.01 significance level, we can reject the null hypothesis that the stock's beta is equal to the market's beta.
- 1.90, and at a 0.01 significance level, we cannot reject the null hypothesis that the stock's beta is equal to the market's beta.
- 2.86, and at a 0.01 significance level, we can reject the null hypothesis that the stock's beta is equal to the market's beta.

Rationale

1.90, and at a 0.01 significance level, we can reject the null hypothesis that the stock's beta is equal to the market's beta.

Given that the market's beta is 1.0, our null hypothesis is as follows: H_0: β_{stock} = 1.0. The calculation of the *t*-statistic is as follows:

$$t = \frac{\overset{\wedge}{\beta_1} - \beta_1}{\overset{\wedge}{\beta_1}} = \frac{0.6 - 1.0}{0.21} = 1.905$$

The calculated *t* value for the sample data is less than the *t*-critical value of 2.819. Therefore, we cannot reject at a 0.01 level of significance that the company's beta could be equal to the market's beta.

Rationale

1.90, and at a 0.01 significance level, we cannot reject the null hypothesis that the stock's beta is equal to the market's beta.

Given that the market's beta is 1.0, our null hypothesis is as follows: H_0: β_{stock} = 1.0. The calculation of the *t*-statistic is as follows:

$$t = \frac{\overset{\wedge}{\beta_1} - \beta_1}{\overset{\wedge}{\beta_1}} = \frac{0.6 - 1.0}{0.21} = 1.905$$

The calculated *t* value for the sample data is less than the *t*-critical value of 2.819. Therefore, we cannot reject at a 0.01 level of significance that the company's beta could be equal to the market's beta.

Rationale

2.86, and at a 0.01 significance level, we can reject the null hypothesis that the stock's beta is equal to the market's beta.

Given that the market's beta is 1.0, our null hypothesis is as follows: H_0: $\beta_{stock} = 1.0$. The calculation of the *t*-statistic is as follows:

$$t = \frac{\overset{\wedge}{\beta_1} - \beta_1}{\overset{\wedge}{\beta_1}} = \frac{0.6 - 1.0}{0.21} = 1.905$$

The calculated *t* value for the sample data is less than the *t*-critical value of 2.819. Therefore, we cannot reject at a 0.01 level of significance that the company's beta could be equal to the market's beta.

Question 2
L2QM-TB0002-1412
LOS: LOS-5910
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium

A statistical software package outputs the following information concerning the relationship between a company's share price returns and market returns:

Covariance	0.00437
Standard deviation of stock	12.5%
Correlation	0.23

Based on the data in the table, which of the following is closest to the variance of the market?

- (selected) 0.0231.
- 0.0546.
- 0.1520.

Rationale

This Answer is Correct

Covariance is related to correlation through the following relationship:

$$Correlation = \frac{Covariance}{Standard\ Deviation\ of\ Stock\ x\ Standard\ Deviation\ of\ Market}$$

Hence, 0.23 = 0.00437/(0.125 standard deviation of market).

Hence, the standard deviation of the market = 0.00437 / (0.125 0.23) = 0.152.

The variance of the market is therefore 0.152^2 = 0.023104.

Question 3
L2R09TB-AC009-1512
LOS: LOS-5910
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium

The relationship between exchange rates (X) and sales (Y) is being examined by an analyst who compiled the following data from a sample.

$\sum (X - \bar{X})^2$	536
$\sum (Y - \bar{Y})^2$	338
$\sum (X - \bar{X})(Y - \bar{Y})$	23.8
Sample size (n)	13

The correlation coefficient between X and Y is *closest to*:

- 0.052
- 0.056
- 0.671

Rationale

0.052

The calculations required are as follows:

$$\text{Standard deviation of X} = s_X = \sqrt{\frac{\sum (X - \bar{X})^2}{n-1}} = \sqrt{\frac{536}{13-1}} = 6.683$$

$$\text{Standard deviation of X} = s_Y = \sqrt{\frac{\sum (Y - \bar{Y})^2}{n-1}} = \sqrt{\frac{338}{13-1}} = 5.30$$

$$\text{Cov}(X,Y) = \frac{\sum_{j=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{(n-1)} = \frac{23.8}{(13-1)} = 1.983$$

$$\text{Correlation coefficient} = r_{XY} = \frac{\text{Cov}(X,Y)}{s_X s_Y} = \frac{1.983}{(6.683)(5.307)} = +0.056$$

Rationale

0.056

The calculations required are as follows:

$$\text{Standard deviation of X} = s_X = \sqrt{\frac{\sum (X - \bar{X})^2}{n-1}} = \sqrt{\frac{536}{13-1}} = 6.683$$

$$\text{Standard deviation of X} = s_Y = \sqrt{\frac{\sum (Y - \bar{Y})^2}{n-1}} = \sqrt{\frac{338}{13-1}} = 5.30$$

$$\text{Cov}(X,Y) = \frac{\sum_{j=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{(n-1)} = \frac{23.8}{(13-1)} = 1.983$$

$$\text{Correlation coefficient} = r_{XY} = \frac{\text{Cov}(X,Y)}{s_X s_Y} = \frac{1.983}{(6.683)(5.307)} = +0.056$$

Rationale

0.671

The calculations required are as follows:

$$\text{Standard deviation of X} = \text{s}_\text{X} = \sqrt{\frac{\sum (X - \bar{X})^2}{n-1}} = \sqrt{\frac{536}{13-1}} = 6.683$$

$$\text{Standard deviation of X} = \text{s}_\text{Y} = \sqrt{\frac{\sum (Y - \bar{Y})^2}{n-1}} = \sqrt{\frac{338}{13-1}} = 5.30$$

$$\text{Cov}(X,Y) = \frac{\sum_{j=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{(n-1)} = \frac{23.8}{(13-1)} = 1.983$$

$$\text{Correlation coefficient} = r_{XY} = \frac{\text{Cov}(X,Y)}{s_X s_Y} = \frac{1.983}{(6.683)(5.307)} = +0.056$$

Question 4
L2R09TB-AC023-1512
LOS: LOS-5980
Lesson Reference: Lesson 3: Prediction Intervals and Limitations of Regression Analysis
Difficulty: medium
An analyst has used a sample of 100 observations to create a regression equation with one independent variable. The intercept coefficient is 2.1 with a standard error of 0.4 and the slope coefficient for the regression is 3.4 with a standard error of 0.7. The variance of the prediction error is 9. If the value of the independent variable is 5.0, the prediction interval for the dependent variable at a 95% confidence level is *closest to*:

- ○ 1.1 to 37.1
- ◉ 13.1 to 25.1
- ○ 14.2 to 24.0

Rationale
❌ **1.1 to 37.1**

First, we get the predicted value of Y using the regression equation:

$$\hat{Y} = b_0 + b_1X = 2.1 + 3.4(5.0) = 19.1$$

Next, we need the standard deviation of the prediction interval, which is equal to the square root of the variance of the prediction error. Hence, we find the square root of 9, which is equal to 3. The last item we need is our *t*-value. Given a sample size of 100 and a 0.05 level of significance, we can immediately estimate the *t*-value to be 2.0 (or 1.96).

Now, we have the inputs needed to generate a prediction interval:

$$95\% \text{ confidence interval} = \hat{Y} \pm t_C s_f = 19.1 \pm 2.0(3.0) = 13.1 \text{ to } 25.1$$

Rationale
✅ **13.1 to 25.1**

First, we get the predicted value of Y using the regression equation:

$$\hat{Y} = b_0 + b_1X = 2.1 + 3.4(5.0) = 19.1$$

Next, we need the standard deviation of the prediction interval, which is equal to the square root of the variance of the prediction error. Hence, we find the square root of 9, which is equal to 3. The last item we need is our *t*-value. Given a sample size of 100 and a 0.05 level of significance, we can immediately estimate the *t*-value to be 2.0 (or 1.96).

Now, we have the inputs needed to generate a prediction interval:

$$95\% \text{ confidence interval} = \hat{Y} \pm t_C s_f = 19.1 \pm 2.0(3.0) = 13.1 \text{ to } 25.1$$

Rationale
❌ **14.2 to 24.0**

First, we get the predicted value of Y using the regression equation:

$$\hat{Y} = b_0 + b_1 X = 2.1 + 3.4(5.0) = 19.1$$

Next, we need the standard deviation of the prediction interval, which is equal to the square root of the variance of the prediction error. Hence, we find the square root of 9, which is equal to 3. The last item we need is our *t*-value. Given a sample size of 100 and a 0.05 level of significance, we can immediately estimate the *t*-value to be 2.0 (or 1.96).

Now, we have the inputs needed to generate a prediction interval:

$$95\% \text{ confidence interval} = \hat{Y} \pm t_C s_f = 19.1 \pm 2.0(3.0) = 13.1 \text{ to } 25.1$$

Question 5
L2R09TB-AC018-1512
LOS: LOS-5960
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium
The sum of the squared errors for a regression is 40 and this is based on a sample size of 30. The sample standard deviation for the dependent variable (Y) is 2.42. The coefficient of determination for the two variables is *closest to*:

- 0.43
- 0.66
- 0.76

Rationale

0.43

The coefficient of determination is the percent of the total variation in Y that is explained by the regression. So we need two of the following three items: total variation, explained variation, and unexplained variation. We are told that the sum of the squared errors is 40, which is the unexplained variation.

We are told that the standard deviation of Y is 2.42. The standard deviation for a variable is calculated as follows:

$$\text{Standard deviation of Y} = \sqrt{\frac{\sum (Y - \bar{Y})^2}{n-1}}$$

The numerator, $\sum (Y - \bar{Y})^2$, represents the total variation in Y. Since we have the sample size and the standard deviation, we can solve for the total variation:

$$2.42 = \left(\frac{\sum (Y - \bar{Y})^2}{30-1}\right)^{0.5} \rightarrow\rightarrow 2.42^2 = \frac{\sum (Y - \bar{Y})^2}{30-1} \rightarrow\rightarrow \sum (Y - \bar{Y})^2 = 169.8356$$

Now, we can solve for the coefficient of determination:

$$\begin{aligned} \text{Coefficient of determination} &= \frac{\text{Total variation} - \text{Unexplained variation}}{\text{Total variation}} \\ &= \frac{169.8356 - 40}{169.8356} = 0.764 \end{aligned}$$

Rationale

0.66

The coefficient of determination is the percent of the total variation in Y that is explained by the regression. So we need two of the following three items: total variation, explained variation, and unexplained variation. We are told that the sum of the squared errors is 40, which is the unexplained variation.

We are told that the standard deviation of Y is 2.42. The standard deviation for a variable is calculated as follows:

$$\text{Standard deviation of Y} = \sqrt{\frac{\sum (Y - \bar{Y})^2}{n-1}}$$

The numerator, $\sum (Y - \bar{Y})^2$, represents the total variation in Y. Since we have the sample size and the standard deviation, we can solve for the total variation:

$$2.42 = \left(\frac{\sum (Y - \bar{Y})^2}{30 - 1} \right)^{0.5} \rightarrow\rightarrow 2.42^2 = \frac{\sum (Y - \bar{Y})^2}{30 - 1} \rightarrow\rightarrow \sum (Y - \bar{Y})^2 = 169.8356$$

Now, we can solve for the coefficient of determination:

$$\begin{aligned} \text{Coefficient of determination} &= \frac{\text{Total variation} - \text{Unexplained variation}}{\text{Total variation}} \\ &= \frac{169.8356 - 40}{169.8356} = 0.764 \end{aligned}$$

Rationale

0.76

The coefficient of determination is the percent of the total variation in Y that is explained by the regression. So we need two of the following three items: total variation, explained variation, and unexplained variation. We are told that the sum of the squared errors is 40, which is the unexplained variation.

We are told that the standard deviation of Y is 2.42. The standard deviation for a variable is calculated as follows:

$$\text{Standard deviation of Y} = \sqrt{\frac{\sum (Y - \bar{Y})^2}{n - 1}}$$

The numerator, $\sum (Y - \bar{Y})^2$, represents the total variation in Y. Since we have the sample size and the standard deviation, we can solve for the total variation:

$$2.42 = \left(\frac{\sum (Y - \bar{Y})^2}{30 - 1} \right)^{0.5} \rightarrow\rightarrow 2.42^2 = \frac{\sum (Y - \bar{Y})^2}{30 - 1} \rightarrow\rightarrow \sum (Y - \bar{Y})^2 = 169.8356$$

Now, we can solve for the coefficient of determination:

$$\begin{aligned} \text{Coefficient of determination} &= \frac{\text{Total variation} - \text{Unexplained variation}}{\text{Total variation}} \\ &= \frac{169.8356 - 40}{169.8356} = 0.764 \end{aligned}$$

Question 6
L2R09TB-AC008-1512
LOS: LOS-5910
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium

The relationship between income (X) and debt (Y) is being evaluated by an analyst who has compiled the following data from a sample.

$\sum (X - \bar{X})^2$	434
$\sum (Y - \bar{Y})^2$	266
$\sum (X - \bar{X})(Y - \bar{Y})$	199
Sample size (n)	12

Based on the gathered sample data, the covariance between X and Y is *closest to*:

- 16.6
- 18.1
- 30.9

Rationale
16.6
The covariance is calculated as follows:

$$Cov(X,Y) = \frac{\sum_{j=1}^{n}(X_t - \bar{X})(Y_t - \bar{Y})}{(n-1)} = \frac{199}{12-1} = 18$$

Rationale
18.1
The covariance is calculated as follows:

$$Cov(X,Y) = \frac{\sum_{j=1}^{n}(X_t - \bar{X})(Y_t - \bar{Y})}{(n-1)} = \frac{199}{12-1} = 18$$

Rationale
30.9
The covariance is calculated as follows:

$$Cov(X,Y) = \frac{\sum_{j=1}^{n}(X_t - \bar{X})(Y_t - \bar{Y})}{(n-1)} = \frac{199}{12-1} = 18$$

Question 7
L2QM-TBB206-1412
LOS: LOS-5970
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium
An analyst is investigating whether the systematic risk of a security is different to that of the market. She performs a linear regression of daily excess returns of the security versus the daily excess returns of the market over a period of 250 trading days and calculates the slope coefficient to be 1.3538 with a standard error of 0.1345. Given a critical *t*-statistic associated with a significance level of 5% of approximately 2, which of the following statistics is most accurate?

- (selected) The analyst should reject the null hypothesis that the security has the same systematic risk as the market.
- The analyst should fail to reject the null hypothesis that the security has the same systematic risk as the market.
- The analyst should accept the alternative hypothesis that the security has the same systematic risk as the market.

Rationale

This Answer is Correct

The null hypothesis for the test will be that the true beta of the security is 1. The alternative hypothesis is that the true beta is not 1. The test statistic takes the value (1.3538 – 1) / 0.1345 = 2.63, which is greater than the critical statistic of 2; hence, the analyst should reject the null hypothesis.

Question 8
L2R09TB-AC015-1512
LOS: LOS-5950
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium
The linear regression model *most likely* assumes:

- (selected) the variance of each error term is normally distributed.
- the variance of the error term differs for all observations.
- the error term is correlated across different observations.

Rationale
✓ **the variance of each error term is normally distributed.**
The error term is assumed to be uncorrelated across observations and has the same variance for all observations.

Rationale
✗ **the variance of the error term differs for all observations.**
The error term is assumed to be uncorrelated across observations and has the same variance for all observations.

Rationale
✗ **the error term is correlated across different observations.**
The error term is assumed to be uncorrelated across observations and has the same variance for all observations.

Question 9
L2ET-PQ0918-1410
LOS: LOS-5950
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium
Which of the following is *least likely* an assumption of linear regression?

- (selected) The independent variable is random.
- The expected value of the error term is 0.
- The error term is uncorrelated across observations.

Rationale

This Answer is Correct

Linear regression assumes that the independent variable, X, is **not** random.

Question 10
L2R09TB-ITEMSET-AC004-1512
LOS: LOS-5970
LOS: LOS-6000
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium

Use the following information to answer the next three questions:

An analyst wishes to identify whether there is a significant *positive* relationship between free cash flow to equity and net income at the 10% level of significance. She has taken a sample of 28 returns and identified a correlation coefficient of 0.3. An extract from the Student's *t*-distribution table is as follows:

Degrees of Freedom	**One-Tailed Probabilities**				
	0.10	0.05	0.025	0.01	0.005
25	1.31635	1.70814	2.05954	2.48510	2.78744
26	1.31497	1.70562	2.05553	2.47863	2.77872
27	1.31370	1.70329	2.05183	2.47266	2.77068
28	1.31253	1.70113	2.04841	2.46714	2.76326
29	1.31143	1.69913	2.04523	2.46202	2.75639
30	1.31042	1.69726	2.04227	2.45726	2.74998

Next, the analyst wishes to use an *F*-test to determine whether the slope coefficient for the regression is significant. The sum of the squares data from an ANOVA table for the regression based on a sample size of 28 is as follows:

	Sum of the Squares
Regression	12
Error	75

i.
At a 10% level of significance, the *t*-statistic for the correlation coefficient is *closest to*:

- (selected) 1.60 and the analyst will conclude that there is a significant relationship between net income and free cash flow to equity.
- 1.60 and the analyst will conclude that there is not a significant relationship between net income and free cash flow to equity.
- 1.55 and the analyst will conclude that there is not a significant relationship between net income and free cash flow to equity.

Rationale

This Answer is Correct

The *t*-statistic for the correlation coefficient is calculated as follows:

$$t = \frac{r\sqrt{(n-2)}}{\sqrt{(1-r^2)}} = \frac{0.3\sqrt{28-2}}{\sqrt{(1-0.3^2)}} = 1.60$$

Because she wants to know whether there is a significant *positive* relationship between net income and free cash flow to equity, she will structure the test to determine if the correlation coefficient is equal to or less than 0 ($r \leq 0$). Therefore, we are performing a one-tailed test with all 0.10 in one tail and with 26 (28 – 2) degrees of freedom. Using the Student's *t*-distribution table, the *t*-critical statistic is found to be 1.31497. Because the *t*-statistic of 1.60 is greater than the *t*-critical statistic of 1.31497, she can reject, at a 10% level of significance, the null hypothesis that there is no significant positive relationship ($r \leq 0$). Hence, she will conclude, at a 10% level of significance, there is a significant relationship between net income and free cash flow to equity.

Rationale

This Answer is Correct

The *t*-statistic for the correlation coefficient is calculated as follows:

$$t = \frac{r\sqrt{(n-2)}}{\sqrt{(1-r^2)}} = \frac{0.3\sqrt{28-2}}{\sqrt{(1-0.3^2)}} = 1.60$$

Because she wants to know whether there is a significant *positive* relationship between net income and free cash flow to equity, she will structure the test to determine if the correlation coefficient is equal to or less than 0 ($r \leq 0$). Therefore, we are performing a one-tailed test with all 0.10 in one tail and with 26 (28 – 2) degrees of freedom. Using the Student's *t*-distribution table, the *t*-critical statistic is found to be 1.31497. Because the *t*-statistic of 1.60 is greater than the *t*-critical statistic of 1.31497, she can reject, at a 10% level of significance, the null hypothesis that there is no significant positive relationship ($r \leq 0$). Hence, she will conclude, at a 10% level of significance, there is a significant relationship between net income and free cash flow to equity.

Rationale

This Answer is Correct

The *t*-statistic for the correlation coefficient is calculated as follows:

$$t = \frac{r\sqrt{(n-2)}}{\sqrt{(1-r^2)}} = \frac{0.3\sqrt{28-2}}{\sqrt{(1-0.3^2)}} = 1.60$$

Because she wants to know whether there is a significant *positive* relationship between net income and free cash flow to equity, she will structure the test to determine if the correlation coefficient is equal to or less than 0 ($r \leq 0$). Therefore, we are performing a one-tailed test with all 0.10 in one tail and with 26 (28 – 2) degrees of freedom. Using the Student's *t*-distribution table, the *t*-critical statistic is found to be 1.31497. Because the *t*-statistic of 1.60 is greater than the *t*-critical statistic of 1.31497, she can reject, at a 10% level of significance, the null hypothesis that there is no significant positive relationship ($r \leq 0$). Hence, she will conclude, at a 10% level of significance, there is a significant relationship between net income and free cash flow to equity.

ii.

In testing whether the slope coefficient for the regression is significant, the *F*-statistic to be used is *closest to*:

- ( ) 2.08
- (•) 4.16
- ( ) 4.32

Rationale

This Answer is Incorrect

The calculation of the *F*-statistic is as follows:

$$F = \frac{\text{Mean sum of the squares for the regression}}{\text{Mean sum of the squares for the error}} = \frac{\text{RSS}/1}{\text{SSE}/(n-2)} = \frac{12/1}{75/(28-2)} = 4.16$$

Rationale

This Answer is Incorrect

The calculation of the *F*-statistic is as follows:

$$F = \frac{\text{Mean sum of the squares for the regression}}{\text{Mean sum of the squares for the error}} = \frac{\text{RSS}/1}{\text{SSE}/(n-2)} = \frac{12/1}{75/(28-2)} = 4.16$$

Rationale

This Answer is Incorrect

The calculation of the *F*-statistic is as follows:

$$F = \frac{\text{Mean sum of the squares for the regression}}{\text{Mean sum of the squares for the error}} = \frac{\text{RSS}/1}{\text{SSE}/(n-2)} = \frac{12/1}{75/(28-2)} = 4.16$$

iii.

When conducting an *F*-test for a regression with one independent variable, it is *most likely* that the:

- (selected) *F*-test will always come to the same conclusion on the significance of the slope coefficient as the *t*-test, if the same level of significance is used for both tests.
- *F*-statistic is calculated as the regression sum of the squares divided by the sum of the squared errors.
- test can give a different result from a significance test on the correlation coefficient.

Rationale

This Answer is Incorrect

Effectively, the *F*-test is duplicating the *t*-test when the regression has only one independent variable. This is because the *F*-test is determining whether all of the slope coefficients for the regression's independent variables are simultaneously equal to 0. The *t*-test is determining whether one slope coefficient is equal to 0. Thus, when there is only one independent variable, both tests will always come to the same conclusion if the level of significance is the same for both tests.

Rationale

This Answer is Incorrect

Effectively, the *F*-test is duplicating the *t*-test when the regression has only one independent variable. This is because the *F*-test is determining whether all of the slope coefficients for the regression's independent variables are simultaneously equal to 0. The *t*-test is determining whether one slope coefficient is equal to 0. Thus, when there is only one independent variable, both tests will always come to the same conclusion if the level of significance is the same for both tests.

Rationale

This Answer is Incorrect

Effectively, the *F*-test is duplicating the *t*-test when the regression has only one independent variable. This is because the *F*-test is determining whether all of the slope coefficients for the regression's independent variables are simultaneously equal to 0. The *t*-test is determining whether one slope coefficient is equal to 0. Thus, when there is only one independent variable, both tests will always come to the same conclusion if the level of significance is the same for both tests.

Question 11
L2ET-PQ0924-1410
LOS: LOS-5990
Lesson Reference: Lesson 3: Prediction Intervals and Limitations of Regression Analysis
Difficulty: medium

An analyst performs a regression with monthly returns on a large-cap mutual fund as the dependent variable and monthly returns on the market index as the independent variable. He uses monthly returns data over the last year (**in %**).

Regression Statistics	
Multiple *R*	0.7589
R-squared	0.576
Standard error	3.8921
Observations	12

	Coefficient	**Standard Error**
Intercept	−0.254	1.2984
Slope coefficient	0.782	0.215

Statistic	**Market Index Return**	**Large-Cap Fund Return**
Mean	2.45%	1.68%
Standard deviation	6.82%	7.21%
Count	12	12

Given a return on the market index of 8.25%, the 95% prediction interval for the expected mutual fund return is *closest to*:

- (selected) −3.0981% to 15.4931%
- −32.5850% to 44.98%
- −25.4295% to 32.64%

Rationale

This Answer is Correct

Predicted return on the large-cap fund = −0.254 + (0.782 × 8.25) = 6.1975%

Estimated variance of the prediction error (s_f^2) of Y, given X, is calculated as:

$$
\begin{aligned}
s_f^2 &= s^2\left[1+\frac{1}{n}+\frac{(\mathrm{X}-\overline{\mathrm{X}})^2}{(n-1)s_x^2}\right] \\
s_f^2 &= 3.8921^2\left\{1+1/12+\left[(8.25-2.45)^2/\,(12-1)\,46.51\right]\right\} \\
s_f^2 &= 17.4069 \\
s_f &= 17.4069^{0.5} = 4.1722
\end{aligned}
$$

Given 10 degrees of freedom, the critical *t*-value for a 95% prediction interval is 2.2281. Therefore, the prediction interval extends from 6.1975 – 2.228 (4.1722) = −3.0981 to 6.1975 + 2.228 (4.1722) = 15.4931

Question 12
L2ET-PQ0919-1410
LOS: LOS-5910
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium
Correlation coefficients computed from sample data are valid as long as:

- The means and variances of the two variables are finite and constant.
- The covariance between the two variables is finite and constant.
- The means and variances of the two variables and the covariance of the two variables are finite and constant.

Rationale

This Answer is Correct

Correlation coefficients computed from sample data are valid as long as the means and variances of the two variables, as well as the covariance of the two variables are finite and constant.

Question 13
L2R09TB-AC014-1512
LOS: LOS-5950
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium
The linear regression model *least likely* assumes:

- uncorrelated error terms.
- a random independent variable.
- a linear relationship between the two variables.

Rationale
uncorrelated error terms.
The independent variable is assumed to be not random.

Rationale
a random independent variable.
The independent variable is assumed to be not random.

Rationale
a linear relationship between the two variables.
The independent variable is assumed to be not random.

Question 14
L2R09TB-AC020-1512
LOS: LOS-5960
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium

Part of an ANOVA table for a regression based on a sample size of 30 is as follows:

	Sum of the Squares	Mean Sum of the Squares
Regression	24	24.000
Error	62	2.214

The correlation coefficient for the regression is *closest* to:

- 0.96
- 0.62
- 0.53

Rationale

0.96

The correlation coefficient, *r*, can be found by taking the square root of the coefficient of determination, R^2. The R^2 can be calculated using the ANOVA table data:

$$R^2 = \frac{\text{Explained variation}}{\text{Total variation}} = \frac{\text{Regression sum of the squares (RSS)}}{\text{Regression sum of the squares (RSS)+Sum of the squared errors (SSE)}}$$
$$= \frac{24}{24+62} = 0.279$$

The correlation coefficient is the square root of 0.279, which is 0.53.

Rationale

0.62

The correlation coefficient, *r*, can be found by taking the square root of the coefficient of determination, R^2. The R^2 can be calculated using the ANOVA table data:

$$R^2 = \frac{\text{Explained variation}}{\text{Total variation}} = \frac{\text{Regression sum of the squares (RSS)}}{\text{Regression sum of the squares (RSS)+Sum of the squared errors (SSE)}}$$
$$= \frac{24}{24+62} = 0.279$$

The correlation coefficient is the square root of 0.279, which is 0.53.

Rationale

0.53

The correlation coefficient, *r*, can be found by taking the square root of the coefficient of determination, R^2. The R^2 can be calculated using the ANOVA table data:

$$
\begin{aligned}
R^2 = \frac{\text{Explained variation}}{\text{Total variation}} &= \frac{\text{Regression sum of the squares (RSS)}}{\text{Regression sum of the squares (RSS)} + \text{Sum of the squared errors (SSE)}} \\
&= \frac{24}{24+62} = 0.279
\end{aligned}
$$

The correlation coefficient is the square root of 0.279, which is 0.53.

Question 15
L2R09TB-AC016-1512
LOS: LOS-5960
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium
The sum of the squared errors for a regression based on a sample size of 40 is 232. The standard error of the estimate (SEE) is *closest to*:

- ○ 0.40
- ○ 2.44
- ● 2.47

Rationale
✖ **0.40**
The calculation of the SEE is as follows:

$$\text{SEE} = \left(\frac{\sum_{j=1}^{n}\left(Y_i - \hat{b}_0 - \bar{b}_1 X_i\right)^2}{n-2}\right)^{\frac{1}{2}} = \left(\frac{\sum_{j=1}^{n}\left(\hat{\varepsilon}_i\right)^2}{n-2}\right)^{\frac{1}{2}} = \left(\frac{232}{40-2}\right)^{0.5} = 2.47$$

Rationale
✖ **2.44**
The calculation of the SEE is as follows:

$$\text{SEE} = \left(\frac{\sum_{j=1}^{n}\left(Y_i - \hat{b}_0 - \bar{b}_1 X_i\right)^2}{n-2}\right)^{\frac{1}{2}} = \left(\frac{\sum_{j=1}^{n}\left(\hat{\varepsilon}_i\right)^2}{n-2}\right)^{\frac{1}{2}} = \left(\frac{232}{40-2}\right)^{0.5} = 2.47$$

Rationale
✔ **2.47**
The calculation of the SEE is as follows:

$$\text{SEE} = \left(\frac{\sum_{j=1}^{n}\left(Y_i - \hat{b}_0 - \bar{b}_1 X_i\right)^2}{n-2}\right)^{\frac{1}{2}} = \left(\frac{\sum_{j=1}^{n}\left(\hat{\varepsilon}_i\right)^2}{n-2}\right)^{\frac{1}{2}} = \left(\frac{232}{40-2}\right)^{0.5} = 2.47$$

Question 16
L2R09TB-AC021-1512
LOS: LOS-6000
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium

Part of an ANOVA table for a regression based on a sample size of 22 is as follows:

	Sum of the Squares	Mean Sum of the Squares
Regression	50	50.0
Error	90	4.5

The *F*-statistic for the regression is *closest to*:

- 0.56
- 11.11
- 13.22

Rationale
0.56
The *F*-statistic calculation is:

$$F = \frac{\text{RSS}/1}{\text{SSE}/(n-2)} = \frac{\text{Mean regression sum of squares}}{\text{Mean squared error}} = \frac{50}{4.5} = 11.11$$

Rationale
11.11
The *F*-statistic calculation is:

$$F = \frac{\text{RSS}/1}{\text{SSE}/(n-2)} = \frac{\text{Mean regression sum of squares}}{\text{Mean squared error}} = \frac{50}{4.5} = 11.11$$

Rationale
13.22
The *F*-statistic calculation is:

$$F = \frac{\text{RSS}/1}{\text{SSE}/(n-2)} = \frac{\text{Mean regression sum of squares}}{\text{Mean squared error}} = \frac{50}{4.5} = 11.11$$

Question 17
L2R09TB-AC024-1512
LOS: LOS-6010
Lesson Reference: Lesson 3: Prediction Intervals and Limitations of Regression Analysis
Difficulty: medium
Which of the following is *least likely* to be a limitation of regression analysis?

- (selected) The residual errors are homoskedastic.
- Regression parameters may change over time.
- Regression relationships may cease to be useful in the future.

Rationale
✅ **The residual errors are homoskedastic.**
Homoskedasticity would not be a limitation. Heteroskedasticity would be a problem.

Rationale
❌ **Regression parameters may change over time.**
Homoskedasticity would not be a limitation. Heteroskedasticity would be a problem.

Rationale
❌ **Regression relationships may cease to be useful in the future.**
Homoskedasticity would not be a limitation. Heteroskedasticity would be a problem.

Question 18
L2ET-PQ0922-1410
LOS: LOS-5990
Lesson Reference: Lesson 3: Prediction Intervals and Limitations of Regression Analysis
Difficulty: medium
The width of a prediction interval is *most likely*:

- (selected) positively related to the standard error of estimate, but negatively related to the standard deviation of the independent variable.
- negatively related to the standard error of estimate, but positively related to the standard deviation of the independent variable.
- positively related to the standard error of estimate and to the number of observations in the sample.

Rationale

This Answer is Correct

The width of a prediction interval is positively related to the standard error of estimate, but negatively related to the standard deviation of the independent variable and the number of observations in the sample.

Question 19
L2ET-PQ0921-1410
LOS: LOS-5960
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium
The width of a confidence interval is *most likely* negatively related to:

- (selected) The number of observations in the sample.
- The standard error of the estimated parameter.
- The value of the estimated parameter based on sample data.

Rationale

This Answer is Correct

- As n increases, the absolute value of t_{crit} falls, reducing the width of the confidence intervals.
- A higher standard error results in a wider confidence interval.
- The value of the estimated parameter from sample data forms the center of the confidence interval. It has no impact on the width of the interval.

Question 20
L200-PQ0002-1412
LOS: LOS-5950
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium
Which of the following linear regression equations has the steepest slope?

- ○ Y = 1 + 1.45B
- ○ Y = 1.5 + 1.50B
- ◉ Y = 1 + 1.55B

Rationale

This Answer is Correct

The slope of a linear regression equation is steepest for Y = 1 + 1.55B.

Question 21
L2R09TB-AC017-1512
LOS: LOS-5960
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium

The relationship between two variables, natural gas consumption (X) and temperature (Y), is being examined by an analyst who has compiled the following data from a sample.

Covariance between X and Y	7.739
Standard deviation of X	4.672
Standard deviation of Y	3.867
Sample size (*n*)	24

The coefficient of determination for X and Y is *closest to*:

- (selected) 0.18
- 0.43
- 0.66

Rationale
0.18 (correct)
The coefficient of determination is the square of the correlation coefficient. Thus, we find the correlation coefficient first and then square it:

$$\text{Correlation coefficient} = r_{\mathrm{XY}} = \frac{\mathrm{Cov(X,Y)}}{s_X s_Y} = \frac{7.739}{(4.672)\,(3.867)} = 0.42859$$
$$\text{Coefficient of determination} = \left(r_{\mathrm{XY}}\right)^2 = (0.42859)^2 = 0.18$$

Rationale
0.43 (incorrect)
The coefficient of determination is the square of the correlation coefficient. Thus, we find the correlation coefficient first and then square it:

$$\text{Correlation coefficient} = r_{\mathrm{XY}} = \frac{\mathrm{Cov(X,Y)}}{s_X s_Y} = \frac{7.739}{(4.672)\,(3.867)} = 0.42859$$
$$\text{Coefficient of determination} = \left(r_{\mathrm{XY}}\right)^2 = (0.42859)^2 = 0.18$$

Rationale
0.66 (incorrect)
The coefficient of determination is the square of the correlation coefficient. Thus, we find the correlation coefficient first and then square it:

$$\text{Correlation coefficient} = r_{\mathrm{XY}} = \frac{\mathrm{Cov(X,Y)}}{s_X s_Y} = \frac{7.739}{(4.672)\,(3.867)} = 0.42859$$
$$\text{Coefficient of determination} = \left(r_{\mathrm{XY}}\right)^2 = (0.42859)^2 = 0.18$$

Question 22
L2ET-ITEMSET-PQ0925-1411
LOS: LOS-5960
LOS: LOS-6000
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium

Previously Questions 25 to 29

Use the following information to answer the next five questions.

An analyst regresses the bid-ask spread (dependent variable) for a sample of 1,900 stocks against the natural log of trading volume (independent variable). The results of the regression are provided below:

ANOVA	**SS**
Regression	18.395
Residual	47.428

	Coefficient	**Standard Error**	***t*-Statistic**
Intercept	0.62941	0.026635	23.63094
Slope coefficient	-0.05248	0.002941	-17.84427

i.
The coefficient of determination is *closest to*:
- (selected) 0.2795
- 0.3879
- 0.7205

Rationale
This Answer is Correct

Coefficient of determination = Explained variation / Total variation

Coefficient of determination = 18.395 / (18.395 + 47.428) = 0.2795

ii.
The correlation coefficient (*r*) is *closest to*:
- 0.6228
- (selected) -0.5286
- 0.5286

Rationale
This Answer is Correct

Correlation coefficient = (Coefficient of determination) $^{0.5}$

Correlation coefficient = $0.2795^{0.5}$ = 0.5286

As the slope coefficient provided in the regression is a negative figure, so the correlation coefficient (*r*) is −0.5286.

iii.

The standard error is *closest to*:

- 0.0984
- 0.1581
- 0.0250

Rationale

This Answer is Correct

Standard error = [SSE / (n – 2)] $^{0.5}$

Standard error = [47.428 / (1900 – 2)] $^{0.5}$ = 0.1581

iv.

The *F*-stat is *closest to*:

- 0.3879
- 736.14
- 0.0014

Rationale

This Answer is Correct

F-stat = MSR / MSE = (RSS / 1) / [SSE / (n – k – 1)]

F-stat = (18.395 / 1) / [47.428 / (1900 – 1 – 1)] = 736.1413

v.

The lower and upper bounds for a 95% confidence interval for the slope coefficient are *closest to*:

	Lower Bound	Upper Bound
A	-0.04672	0.05824
B	-0.05824	-0.04672
C	0.04672	0.05824

- Row A
- Row B
- Row C

Rationale

This Answer is Correct

The critical *t*-value for a two-tailed test at the 5% significance level with 1,898 degrees of freedom is approximately 1.96.

Therefore:

Lower bound = −0.05248 – (1.96 × 0.002941) = −0.05824

Upper bound = −0.05248 + (1.96 × 0.002941) = −0.04672

Question 23
L2ET-ITEMSET-PQ0930-1411
LOS: LOS-5970
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA
Difficulty: medium

Use the following information to answer the next two questions.

An analyst regresses returns for ABC Stock against the market index using monthly returns data from January 2008 to December 2012. The results of the regression are shown below:

	Coefficients	Standard Error	*t*-Statistic
Alpha	0.0058	0.0164	0.3537
Beta	1.1232	0.2985	3.7628

i.

The analyst wants to test whether the stock has the same level of systematic risk as the overall market and structures the following hypotheses:

H_0: $\beta_{ABC} = 1$ versus H_a: $\beta_{ABC} \neq 1$

Given a 5% significance level, which of the following statements is *most likely*?

- Since the *t*-stat is greater than the critical *t*-value, the analyst can reject the null hypothesis. He should conclude that the stock does not have the same level of systematic risk as the overall market.
- Since the *t*-stat is lower than the critical *t*-value, the analyst cannot reject the null hypothesis. He should conclude that the stock has the same level of systematic risk as the overall market.
- Since the *t*-stat is lower than the critical *t*-value, the analyst cannot reject the null hypothesis. He should conclude that the stock does not have the same level of systematic risk as the overall market.

Rationale

This Answer is Correct

t-stat = (1.1232 – 1) / 0.2985 = 0.4127

For a two-tailed test, given a 5% level of significance and 58 degrees of freedom, the critical *t*-value is 2.00. Since the *t*-stat is less than the critical t-value, we cannot reject the null hypothesis. We conclude that the stock has the same level of systematic risk as the overall market.

ii.

The analyst wants to test whether the intercept term is positive and structures the following hypotheses:

H_0: $b_0 \leq 0$ versus H_a: $b_0 > 0$

Given a 5% significance level, which of the following statements is *most accurate*?

- Since the *t*-stat is greater than the positive critical *t*-value, the analyst can reject the null hypothesis. He should conclude that the intercept term is positive.
- Since the *t*-stat is greater than the negative critical *t*-value, the analyst cannot reject the null hypothesis. He should conclude that the intercept not positive.
- Since the *t*-stat is lower than the positive critical *t*-value, the analyst cannot reject the null hypothesis. He should conclude that the intercept term is not positive.

Rationale

This Answer is Correct

t-stat = 0.0058 / 0.0164 = 0.3537

For a one-tailed test, given a 5% level of significance and 58 degrees of freedom, the critical *t*-value is 1.67. Since the *t*-stat is lower than the critical *t*-value, the analyst cannot reject the null hypothesis. He should conclude that the intercept term is not greater than zero.

Question 24
L2QM-ITEMSET-TBB201-1412
LOS: LOS-5960
Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA

The following two questions relate to the following information:

An analyst is estimating the relationship between stock market returns and inflation. He uses a simple linear regression with inflation as the independent variable based on 10 years of monthly data. The regression yields the following statistics:

Sum of squared residuals of the model	0.003
Sum of squared deviations of stock market returns from their mean	0.016

i.
Which of the following values is closest to the standard error of the estimate for this model?

- ○ 0.00300.
- ◉ 0.00504.
- ○ 0.01936.

Rationale

This Answer is Correct

The standard error of the estimate (SEE) is defined as the square root of the sum of squared residuals of the model divided by the degrees of freedom of the residual, which is $n - k - 1$, where k is the number of independent variables. Hence, in this case:

SEE = $(0.003 / 118)^{0.5}$ = 0.00504.

ii.
Which of the following values is closest to the coefficient of determination for this model?

- ○ 0.0160.
- ○ 0.1875.
- ◉ 0.8125.

Rationale

This Answer is Correct

The coefficient of determination of a linear regression is defined as the proportion of total variation in the dependent variable that is explained by the model. In this case, this would be (0.016 – 0.003) / 0.016 = 0.8125.

Question 25
L2R09TB-ITEMSET-AC001-1512
LOS: LOS-5910
LOS: LOS-5930
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium

Use the following information to answer the next 3 questions:

An analyst believes that the return patterns of medium-cap growth stocks and medium-cap value stocks are different. He identifies that, for a sample of size 60, the sample correlation coefficient for returns on medium-cap value stocks and medium-cap growth stocks is 0.01.

The medium-cap growth stocks and medium-cap value stocks include global securities with currency exposure. The analyst is interested in the correlations between major currencies found in the portfolio. Details of a correlation matrix of monthly returns in U.S. dollars to selected foreign currency returns for different time periods are shown below.

1990 - 1999	**British Pound**	**Swiss Franc**	**Yen**
British Pound	1.00		
Swiss Franc	0.32	1.00	
Yen	0.41	0.53	1.00
2000 - 2009	British Pound	Swiss Franc	Yen
British Pound	1.00		
Swiss Franc	–0.02	1.00	
Yen	0.28	0.34	1.00

The analyst also believes that the returns to medium-cap stocks are positively linked to growth in real GDP. Using a sample of 27 observations, he estimates that the b_1 coefficient for the regression is 0.4 with a standard error of 0.15.

The analyst decides to test this belief by testing the hypothesis that returns of mid-cap growth stocks are not linked to growth in real GDP. He opts to complete this test using a 1.0 percent level of significance. He has gathered a portion of the Student's *t*-distribution to use in his test:

Degrees of Freedom	**One-Tailed Probabilities**				
	0.10	0.05	0.025	0.01	0.005
25	1.31635	1.70814	2.05954	2.48510	2.78744
26	1.31497	1.70562	2.05553	2.47863	2.77872
27	1.31370	1.70329	2.05183	2.47266	2.77068
28	1.31253	1.70113	2.04841	2.46714	2.76326
29	1.31143	1.69913	2.04523	2.46202	2.75639
30	1.31042	1.69726	2.04227	2.45726	2.74998

i.
With regard to the analyst's belief that the returns of medium-cap growth stocks and medium-cap value stocks are different, his belief is *most likely*:

- (selected) supported by his sample.
- not supported by his sample.
- either supported or not supported, but it depends on the time period examined.

Rationale
This Answer is Correct

The very low correlation coefficient between the two variables of 0.01 indicates that it is extremely likely that the two variables are different.

Rationale

This Answer is Correct

The very low correlation coefficient between the two variables of 0.01 indicates that it is extremely likely that the two variables are different.

Rationale

This Answer is Correct

The very low correlation coefficient between the two variables of 0.01 indicates that it is extremely likely that the two variables are different.

ii.

With respect to the correlation matrix of monthly returns in U.S. dollars to holding British pounds, Swiss francs, or yen for different time periods, it is *most likely* the case that:

- correlations between currencies increased over time.
- diversification benefits from investing in different currencies increased over time.
- the correlation between the Swiss franc and yen derived returns is lower than for other currencies.

Rationale

This Answer is Incorrect

As the tables show, the correlations are consistently lower in the 2000s than they were in the 1990s. This means that more diversification benefits are available, as lower correlation coefficients indicate greater possibilities for diversification.

Rationale

This Answer is Incorrect

As the tables show, the correlations are consistently lower in the 2000s than they were in the 1990s. This means that more diversification benefits are available, as lower correlation coefficients indicate greater possibilities for diversification.

Rationale

This Answer is Incorrect

As the tables show, the correlations are consistently lower in the 2000s than they were in the 1990s. This means that more diversification benefits are available, as lower correlation coefficients indicate greater possibilities for diversification.

iii.

With respect to his hypothesis test on the relationship between returns of mid-cap growth stocks and growth in real GDP, the analyst will *most likely* conclude that, at a 1.0 percent level of significance, the returns of mid-cap growth stocks are:

- linked to growth in real GDP because the calculated *t*-statistic of 4.00 falls outside the *t*-critical range for the null hypothesis that the b_1 coefficient could be 0.
- linked to growth in real GDP because the calculated *t*-statistic of 2.67 falls outside the *t*-critical range for the null hypothesis that the b_1 coefficient could be 0.

not linked to growth in real GDP because the calculated t-statistic of 2.67 does not fall outside the t-critical range for the null hypothesis that the b_1 coefficient could be 0.

Rationale

This Answer is Incorrect

The null hypothesis is as follows: H_0: $b_1 = 0$. The regression based on the sample has generated a b_1 value of 0.4 and this value has a standard error of 0.15. In order to complete the test, we need to find the t-statistic and the t-critical using the Student's t-distribution with 0.005 in each tail and 25 ($n - 2 = 27 - 2$) degrees of freedom. The t-statistic is compared to the t-critical and the decision is made whether to reject or not reject the null hypothesis.

The t-critical using the Student's t-distribution table is 2.78744. The t-statistic is calculated as follows:

$$t = \frac{\hat{b}_1 - b_1}{s_{\hat{b}_1}} = \frac{0.4 - 0}{0.15} = 2.66667$$

Because the t-statistic of 2.66667 falls within the range of ±2.78744, the analyst, at a 1.0 percent level of significance, cannot reject that returns of mid-cap growth stocks are not linked to growth in real GDP. In other words, he cannot reject that b_1 could be equal to 0.

Rationale

This Answer is Incorrect

The null hypothesis is as follows: H_0: $b_1 = 0$. The regression based on the sample has generated a b_1 value of 0.4 and this value has a standard error of 0.15. In order to complete the test, we need to find the t-statistic and the t-critical using the Student's t-distribution with 0.005 in each tail and 25 ($n - 2 = 27 - 2$) degrees of freedom. The t-statistic is compared to the t-critical and the decision is made whether to reject or not reject the null hypothesis.

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Because the t-statistic of 2.66667 falls within the range of ±2.78744, the analyst, at a 1.0 percent level of significance, cannot reject that returns of mid-cap growth stocks are not linked to growth in real GDP. In other words, he cannot reject that b_1 could be equal to 0.

Rationale

This Answer is Incorrect

The null hypothesis is as follows: H_0: $b_1 = 0$. The regression based on the sample has generated a b_1 value of 0.4 and this value has a standard error of 0.15. In order to complete the test, we need to find the t-statistic and the t-critical using the Student's t-distribution with 0.005 in each tail and 25 ($n - 2 = 27 - 2$) degrees of freedom. The t-statistic is compared to the t-critical and the decision is made whether to reject or not reject the null hypothesis.

The t-critical using the Student's t-distribution table is 2.78744. The t-statistic is calculated as follows:

$$t = \frac{\hat{b}_1 - b_1}{s_{\hat{b}_1}} = \frac{0.4 - 0}{0.15} = 2.66667$$

Because the t-statistic of 2.66667 falls within the range of ±2.78744, the analyst, at a 1.0 percent level of significance, cannot reject that returns of mid-cap growth stocks are not linked to growth in real GDP. In other words, he cannot reject that b_1 could be equal to 0.

Question 26
L2R09TB-AC022-1512
LOS: LOS-6010
Lesson Reference: Lesson 3: Prediction Intervals and Limitations of Regression Analysis
Difficulty: medium
When making a prediction of a dependent variable based on a regression with one independent variable, uncertainty arises *most likely* due to:

- ○ the error term only.
- ○ the parameters only.
- ◉ the error term and the parameters used.

Rationale
✗ **the error term only.**
The estimates of the parameters may be incorrect and the actual value of Y may differ from the predicted value of Y even if the parameters were correct.

Rationale
✗ **the parameters only.**
The estimates of the parameters may be incorrect and the actual value of Y may differ from the predicted value of Y even if the parameters were correct.

Rationale
✓ **the error term and the parameters used.**
The estimates of the parameters may be incorrect and the actual value of Y may differ from the predicted value of Y even if the parameters were correct.

Question 27

L2ET-PQ0920-1410

LOS: LOS-5960

Lesson Reference: Lesson 2: The Standard Error of Estimate, Coefficient of Determination, Hypothesis Testing, and ANOVA

Difficulty: medium

Which of the following is *most likely* regarding the use of confidence intervals to conduct hypothesis tests?

- (selected) In a confidence interval, we aim to determine whether the hypothesized value of the population parameter lies within the interval, where the interval is based around the sample statistic.
- In a confidence interval, we aim to determine whether the sample statistic lies within the interval, where the interval is based around the hypothesized value of the population parameter.
- In a confidence interval, we aim to determine whether the hypothesized value of the population parameter lies within the interval, where the interval is based around the sample test statistic.

Rationale

This Answer is Correct

In a confidence interval, we aim to determine whether the hypothesized value of the population parameter (e.g., slope coefficient) lies within the interval, where the interval is based around the estimate of the parameter based on sample data.

Question 28
L2QM-ITEMSET-TBX101-1502
LOS: LOS-5980
LOS: LOS-5990
Lesson Reference: Lesson 3: Prediction Intervals and Limitations of Regression Analysis
Difficulty: easy

The next two questions relate to the following information:

An analyst is conducting a linear regression of the total return of a collateralized commodity futures index against inflation, using 48 monthly returns in percent, deriving the following results:

***R*-squared**	0.421
Standard error of estimate	2.595
Observations	48

	Coefficient	**Standard error**	***t*-statistic**
Intercept	0.123	0.231	0.532
Inflation	0.858	0.391	2.194

Statistic	**Inflation**
Mean	0.208
Standard deviation	0.899

i.
What is the predicted total return on the collateralized commodity futures index for an inflation reading of 0.25%?

- 0.125%
- 0.338%
- 12.515%

Rationale
This Answer is Correct
Using the coefficients in the output of the regression, the predicted total return of the collateralized commodity index for an inflation reading of 0.25% is given by:

$$0.123 + 0.858 \times (0.25) = 0.3375\%$$

ii.

The analyst who derived the regression model makes the following two statements:

Statement 1:

“When establishing a confidence interval for the predicted total return of the collateralized commodity index given an expected inflation reading, the center of the interval will always be the predicted total return of the collateralized commodity index using the model.”

Statement 2:

“The width of the confidence interval for the predicted total return of the collateralized commodity index given an expected inflation reading will increase as the expected inflation reading moves away from the mean inflation reading.”

How many of the analyst's statements are correct?

- Neither.

- ○ One.
- ◉ Both.

Rationale

This Answer is Correct

The confidence interval for the predicted total return of the collateralized commodity index is always centered on the predicted value of the dependent variable, given an expected value for the independent variable; hence, Statement 1 is correct. The width of the interval is the relevant *t*-statistic for a required confidence level multiplied by the square root of the variance of the prediction error. The formula for the variance of the prediction error is given by:

$$s_f^2 = s^2\left[1 + \frac{1}{n} + \frac{(X - \overline{X})}{(n-1)s_X^2}\right]$$

Hence, as the distance of the expected inflation reading from the mean inflation reading, $X - \overline{X}$, increases, the variance of the prediction error will increase and the width of the prediction interval will increase. Hence, Statement 2 is correct.

Question 29
L2QM-TB0005-1412
LOS: LOS-5950
Lesson Reference: Lesson 1: Linear Regression
Difficulty: medium
Which of the following statements is *least likely* to be an assumption of linear least squares regression analysis?

- (selected) The independent variable is random.
- The expected value of the error term in the model is zero.
- The variance of the error term is constant for all observations.

Rationale

This Answer is Correct

An assumption of the linear least squares regression model is that the independent variable is not random. In practice, we often use an independent variable that is random, for example, market returns, so long as this does not cause issues with the error term of the model. Answers B and C are standard assumptions of linear least squares regression analysis.