**Question 1. 1.** You are given only three quarterly seasonal indices and quarterly seasonally adjusted data for the entire year.  What is the raw data value for Q4?  Raw data is not adjusted for seasonality.

Quarter   Seasonal  Index             Seasonally Adjusted Data

Q1              .80                               295

Q2              .85                               299

Q3             1.15                              270

Q4              ---                                271

(Points : 3)

     A.   325

     B.  225

     C.   252

     D.   271

|  |
| --- |
| **Question 2. 2.**One model of exponential smoothing will provide almost the same forecast as a liner trend method.  What are linear trend intercept and slope counterparts for exponential smoothing? (Points : 3) |

A. Alpha and Delta

B. Delta and Gamma

C. Alpha and Gamma

D. Std. Dev and Mean

**Question 3. 3.**Why is the residual mean value important to a forecaster? (Points : 3)

     A.   Large mean values indicate nonautoregressiveness.

       B.  Small mean values indicate the total amount of error is small.

        C. **Large absolute mean values indicate estimate bias.**

        D. Large mean values indicate the standard error of the model is small.

**Question 4. 4.**When performing correlation analysis what is the null hypothesis?  What measure in Minitab is used to test it and to be 95% confident in the significance of correlation coefficient. (Points : 3)

A. Ho:  r = .05    p < .5

B. Ho:  r = 1     p =.05

C. Ho:  r ≠ 0      p≤.05

D. Ho: r = 0       p≤.05

|  |  |
| --- | --- |
| **Question 5. 5.**In decomposition what does the cycle factor (CF) of .80 represent for a monthly forecast estimate of a Y variable? (Points : 3)         A. The estimated value is 80% of the average monthly seasonal estimate.         B. The estimate is .80 of the forecasted Y trend value.         C. The estimated value is .80 of the historical average CMA values.         D. The estimated value has 20% more variation than the average historical Y data values. |  |

**Question 6. 6.**A Burger King franchise owner notes that the sales per store has fallen below the stated national Burger King outlet average of $1,258,000.  He asserts a change has occurred that reduced the fast food eating habits of Americans.  What is his hypothesis (H1) and what type of test for significance must be applied? (Points : 3)

      A.  H1: u ≥ $1.258,000  A one-tailed t-test to the left.

      B.  H1:  u = $1.258,000 A two-tailed t-test.

      C.  H1:  u < $1.258,000 A one-tailed t-test to the left.

      D.  H1:  p < $1.258,000 A one-tailed test to the right.

**Question 7. 7.** The CEO of Home Depot wants to see if city size has any relationship to the current profit margins of the company stores.  What data type will he likely use to determine this?(Points : 3)

      A.  Time series data of profits by store.

      B.  Recent 10 year sample of profits by stores.

      C.  Recent cross section of store profits by city.

      D.  Trend of a random sample of store profits over time.

**Question 8. 8.**Sometimes forecasters get lazy or forgetful and do not check the significance of XY data correlations and use the X variable to forecast Y.    What is the result of this? (Points : 3)

       A. Type 2 error

       B. Autocorrelation error

       C. Type 3 error

       D. Type 1 error

**Question 9. 9.**In exponential smoothing what is the weight of the alpha coefficient for a time series data observation from the 3rd previous period if the original  alpha value is set at .3? (Points : 3)  **Is there a formula for this? Where does this come from?**

       A. The weight cannot be calculated since the data observation is not given.

       B. The weight is zero since the alpha value is set relatively high.

       C. 0.125

       D. 0.103

       E. 0.084

**Question 10. 10.**What is not a characteristic of a random data series? (Points : 3)

      A.  Zero mean with an normal distribution

      B. ACF LBQ values greater than a .05 confidence level.

      C. Non Autoregressive observations

      D. Central tendency

**Question 11.** **11.**What is the major cause of non randomness (autoregressiveness) in business data? (Points : 3)

       A. Randomness only occurs for short time periods.

       B. Random events such as storms or technologies offset over the long run.

       C. Measurements naturally increase or decrease over time.

       D. Business participant’s decisions and work.

**Question 12.** **12.**

Given the data series below for variables Y (Monthly Inventory Balance) and X (Monthly Sales) are they significantly correlated at the 95% confidence level and how can you tell?  (This data also appears in the docsharing download for Exam 1 excel worksheet under the problem 12 tab.)

|  |  |  |
| --- | --- | --- |
| Ending Inv. Bal. Y |  | Monthly Sales X |
| 1544 |  | 5053 |
| 1913 |  | 5052 |
| 2028 |  | 7507 |
| 1178 |  | 2887 |
| 1554 |  | 3880 |
| 1910 |  | 4454 |
| 1208 |  | 3855 |
| 2467 |  | 8824 |
| 2101 |  | 5716 |

(Points : 3)

      A.  Yes.  The correlation coefficient is .873 that is greater than .05.

      B.  Yes. The correlation p-value is .002 which is less than .05.

      C.  No. The correlation coefficient is above the p-value.

      D.  No. The correlation p-value is greater than the 95% confidence level.

**Question 13.** **13.**You have forecast the sales for your company for the last 12 months and the forecast residuals are shown below.  Are these residuals to be considered random?  (This data also appears in the docsharing excel worksheet download for Exam 1 under the Problem 13 tab.)

Residuals

-24

-348

-892

-62

-378

-489

-342

34

490

23

578

198

(Points : 3)

       A. Yes, since the residuals randomly vary in magnitude.

       B. Yes since the residuals are positive and negative and vary in magnitude.

       C. No, since the residuals are stationary and vary in magnitude.

       D. No, since the residuals indicate positive slope.

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| **Question 14.** **14.**Which form of exponential smoothing can result in a naïve forecast? (Points : 3)        A. Winters with a very low seasonal coefficient.        B. Single with a very low trend coefficient  C. Single with a very high alpha value  D. Double with a very low alpha value  **Question 15**. **15.**What primary statistical characteristic enables forecasters to move from uncertainty to quantifiable low risk in the business forecasting process? (Points : 3)        A.. Large amounts of available business data naturally create statistical accuracy.        B. Although business data are not normally distributed the statistics from the data are normally distributed.        C.  Statistical forecasting technology has improved the accuracy of models to the point that forecast will not be needed.        D.  Statistical t and p-values determine the model accuracy.  **Question 16.** **16.**What is used to determine the forecast model confidence level for Exponential Smoothing and Decomposition models?(Points : 3)       A.  The significance level of the smoothing constants       B.  The error measures       C.  The residual LBQ Chi-square values       D.  The mean of the residuals  **Question 17. 17.**You are responsible for forecasting your company’s revenues for the next 24 months. You have three years of historical monthly data and previous forecasts that indicate that the company revenues with no obvious seasonality have grown significantly over that time.   Which forecast method would you apply to the problem? (Points : 3)        A. 3 period moving average        B. 12 period moving average        C. Simple exponential smoothing        D. Double exponential smoothing  **Question 18.** **18.**You obtained a correlation coefficient from two data series that indicates a p-value of .97.  Can you be 95% confident that the correlation is significantly different from zero? (Points : 3)         A. Yes, since the p value is above the confidence level.         B. Yes, since the p value is above 1 minus the confidence level.         C. No, since the p-value is above the 1 minus the confidence level.         D. No, since the data is not provided to determine true confidence.  **Question 19.** **19.**In decomposition the seasonal indices are the period relationships between what two data series?(Points : 3)         A. Seasonal moving averages and the trend data series.         B. Smoothed data from centered moving averaging (seasonally adjusted) and the original data series.         C. Trend data and the cycle factors.         D. Trend data and the original data series.  **Question 20**. **20.**If you have trend in a data series how can you confirm it and determine if it is statistically significant" (Points : 3)  A. Autocorrelation functions that spike in the 4th and 8th quarters and have LBQ values below the LBQ table values.  B. A time series plot that shows the data rising and falling.  C. Histogram that shows the data centered around a zero mean value with a normal distribution.  D. Autocorrelation functions that step down toward zero and have LBQ values above the Chi-square tables values  **Question 21**. **21.**Golfsmith a sporting goods company requires an eight quarter sales forecast.  From the revenue data below (also found in Doc Sharing under Exam 1 Data Problem 21) what is the appropriate exponential smoothing model to apply in order to develop the best quarterly forecast?   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | **Date** | **Revenue** | | 3/31/2006 | 74.810 | | 6/30/2006 | 114.138 | | 9/29/2006 | 93.980 | | 12/29/2006 | 74.962 | | 3/30/2007 | 77.663 | | 6/29/2007 | 124.999 | | 9/28/2007 | 106.527 | | 12/31/2007 | 78.969 | | 3/31/2008 | 79.236 | | 6/30/2008 | 129.995 | | 9/30/2008 | 101.702 | | 12/31/2008 | 67.840 | | 3/31/2009 | 68.793 | | 6/30/2009 | 114.797 | | 9/30/2009 | 90.586 | | 12/31/2009 | 63.850 | | 3/31/2010 | 67.649 | | 6/30/2010 | 118.046 | | 9/30/2010 | 93.272 | | 12/31/2010 | 72.885 | | 3/31/2011 | 81.515 | | 6/30/2011 | 130.220 | | 9/30/2011 | 100.997 | | 12/30/2011 | 74.535 | | 3/30/2012 | 90.456 |   (Points : 4)       A.   Double Exponential Smoothing (Holt's)       B.   Single Exponential Smoothing       C.   4 Period Moving Average       D.  Winter's Exponential Smoothing       E.   Linear Trend  **Question 22.** **22.**Run the data with the exponential smoothing model that applies and obtain the best model by adjusting each of the coefficients.  **(Do not use Optimal ARIMA to find the smoothing coefficients.  Make sure that you only use one decimal place for each coefficient – e.g.  .1, or .2, or .3 …. through .9.)** What coefficient values will result in the best exponential smoothing result and the lowest error? (Points : 4)       A.   .9 level, .8 trend, .9 seasonal       B.  .9 level, .5 trend |  |   C. .9 level, .1 trend, .1 seasonal  D.  .2 level, .6 trend, .9 seasonal         .2 level.  **Question 23**. **23.**What is the RMSE for the Fit period for the best exponential smoothing model? (Points : 4)        A.  22.63       B.   3.75       C.  1.31       D.   14.06       E.   142.76  **Question 24**. **24.**Use the best exponential smoothing model to generate a forecast for 8 quarters.  What is the forecast value for the 8th quarter? (Points : 4)       A.   28.1       B.   85.1       C.   60.4       D.   46.8       E.  75.3  **Question 25.** **25.**The Fit period residuals from the best exponential smoothing model are autocorrelated through the 12th lag. (Points : 4)         A. True         B.  False  **Question 26.** **26.**Use the same quarterly Golfsmith sales data series and run a decomposition model and estimate 8 forecast periods.  Which quarter has the greatest seasonal sales? (Points : 4)         A. Quarter 1         B.  Quarter 2         C.  Quarter 4         D. Quarter 3  **Question 27**. **27.**What is the decomposition forecast value for the 8th period (last forecast quarter).  Be sure to adjustthe forecast with the most recent (last) cycle factor. (Points : 4)        A.  65.0        B.  61.5        C.  103.8        D. 58.2        E. 73.2  **Question 28.** **28.** Are the decomposition fit period residuals random?  Why or why not? (Points : 4)       A.  No.  They still have seasonality. |  |  |

B. No. They still have significant cycle.

C. Yes. They are normally distributed with a near zero mean.

D. Yes. None of the residuals are significantly autoregressive.

**Question 29.** **29.**Based on your analysis of the best exponential smoothing and cycle adjusted decomposition forecast MAPE and residual analysis which model produces the best results and why? (Points : 4)

    A.   The exponential smoothing model forecast is best since it picked up cycle better than the adjusted decomposition forecast and produced more random residuals.

B. The decomposition forecast is best since it picks up seasonality much better than the exponential smoothing model and produces high Chi-square values.

C. The exponential smoothing model is best since it has lower error measures than the decomposition model forecast and is, therefore, more accurate.

D. The decomposition model forecast is best since the forecast is closer to the Hold Out and it produced lower error for the forecast period.

**Question 30.** **30.**Forecast error measures and residual analysis can only be used where quantitative forecast methods and models are applied to data. (Points : 4)

     A.  True

     B.  False