Name(s) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**BA 353: Take Home Exam 1 Key**

**1) (10 points) Forecasting:** The monthly data for about 160 StoneAge parts over a three-year period are available online. Why don’t we try to forecast just **Part 90** for the next period (January of 2018/period 37)? This data is on Row 88 of the spreadsheet from Columns F to AO. a) Forecast period 37 using the Naïve method, Moving Averages with **N = 12** (*not* *N =2 as we’ve done in class*), Linear Regression and Exponential Smoothing. Program MS Excel to do the calculations for you, don’t try to do this by hand, and ***round your final answers to one decimal place***. Hint: I’ve done the forecast for Naïve for you and it might be a good idea to copy the 36 data points and paste them into a separate sheet vertically using the Transpose function.

|  |  |  |
| --- | --- | --- |
| Method | FC | MAD |
| Naïve | 82 | 38 |
| MA(**12**) | 65 | 29 |
| ES | 62 | 31 |
| LR | 62 | 25 |

b) Draw a scatter diagram of the data and paste it here. Do you see any obvious patterns? Not really, pretty random…



c) According to MAD, which forecast is

the best bet for period 37?

62 ± 25

d) Bayesian Information Criterion, Mean Absolute Percentage Error, Symmetric MAPE, Root Mean Square Error

**2) (10 points)** **Seasonality:** **a)** Sum up the totals for each year and fill in the blanks below. **b)** Forecast demand for each month and the total for 2013 using linear regression. **c)** Graph the monthly data *and* forecasts (preferably with a different marker/color) in **chronological order** to display the seasonal pattern. **d)** Determine the slope for each month and fill in the blanks below. According to the slopes, which **two** months are growing the fastest (at about the same rate)? May and October (due to the popularity of seasonal beers Mexican Logger and Euphoria.)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | **9** | **10** | **11** | **12** | **13** | **Slope** |
| January | $183,481 | $257,782 | $309,313 | $365,117 | **$428,033** |  $ 59,644  |
| February | $160,674 | $215,592 | $313,726 | $381,677 | **$458,203** |  $ 76,114  |
| March | $218,095 | $346,604 | $332,353 | $416,746 | **$473,875** |  $ 58,170  |
| April | $222,372 | $264,723 | $351,315 | $525,876 | **$590,348** |  $ 99,711  |
| May | $278,188 | $367,369 | $602,500 | $649,204 | **$811,360** |  **$ 134,818**  |
| June | $294,763 | $429,907 | $554,599 | $572,670 | **$702,588** |  $ 95,841  |
| July | $327,825 | $420,999 | $508,422 | $653,534 | **$743,833** |  $ 106,455  |
| August | $332,121 | $475,822 | $613,860 | $554,901 | **$695,771** |  $ 80,638  |
| September | $310,011 | $397,577 | $402,091 | $626,399 | **$672,439** |  $ 95,368  |
| October | $294,756 | $440,234 | $520,636 | $717,822 | **$830,762** |  **$ 134,960**  |
| November | $211,514 | $305,238 | $303,034 | $529,011 | **$574,771** |  $ 95,029  |
| December | $225,591 | $335,135 | $385,686 | $440,188 | **$520,235** |  $ 69,434  |
|  Total | $3,059,390 | $4,256,982 | $5,197,535 | $6,433,145 | **$7,502,217** |  **$ 1,106,182**  |

**e)** Interpret the slope for the two fastest growing month(s) **and** interpret the annual slope.

From 2009 to 2012, sales in May and October grew by about $135,000. During the same time, annual growth was over a million dollars per year (at $1.106M/year)!

**Extra Credit:** Forecast demand for each month in 2013 using the =forecast.ets() function in MS Excel. Good luck!

|  |
| --- |
| **Extra Credit** |
| 513977 |
| 495023 |
| 570512 |
| 536174 |
| 713741 |
| 682999 |
| 697630 |
| 727897 |
| 681243 |
| 694427 |
| 579913 |
| 600890 |

