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

You may work together in teams of up to three students on this assignment as long as all students put in an equal amount of effort. No freeloaders!

**BA 353: Take Home Exam 1**

Due on Friday 9/27/19 by 2:30pm.

**1) (5 points)** **Seasonality:** The data in the table below (and available online) represent monthly gross sales for Ska Brewing Company from 2009 to 2012. This is *real (old) data*, let’s help Ska forecast 2013…

**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. Note: This table is *transposed* compared to the seasonality example we looked at in class – in this case, you will be forecasting horizontally.

**c)** Graph the monthly data *and* forecasts (preferably with a different marker/color) in **chronological order** to display the seasonal pattern. Attach or insert a **printout** of this graph.

**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)?

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | **9** | **10** | **11** | **12** | **13** | **Slope** |
| **January** |  $ 193,481  |  $ 267,782  |  $ 319,313  |  $ 375,117  |   |   |
| **February** |  $ 170,674  |  $ 225,592  |  $ 323,726  |  $ 391,677  |   |   |
| **March** |  $ 228,095  |  $ 356,604  |  $ 342,353  |  $ 426,746  |   |   |
| **April** |  $ 232,372  |  $ 274,723  |  $ 361,315  |  $ 535,876  |   |   |
| **May** |  $ 288,188  |  $ 377,369  |  $ 612,500  |  $ 659,204  |   |   |
| **June** |  $ 304,763  |  $ 439,907  |  $ 564,599  |  $ 582,670  |   |   |
| **July** |  $ 337,825  |  $ 430,999  |  $ 518,422  |  $ 663,534  |   |   |
| **August** |  $ 342,121  |  $ 485,822  |  $ 623,860  |  $ 564,901  |   |   |
| **September** |  $ 320,011  |  $ 407,577  |  $ 412,091  |  $ 636,399  |   |   |
| **October** |  $ 304,756  |  $ 450,234  |  $ 530,636  |  $ 727,822  |   |   |
| **November** |  $ 221,514  |  $ 315,238  |  $ 313,034  |  $ 539,011  |   |   |
| **December** |  $ 235,591  |  $ 345,135  |  $ 395,686  |  $ 450,188  |   |   |
| **Total** |   |   |   |   |   |   |

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

**2) (5 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 121** for the next period (January of 2018/period 37)? This data is on Row 119 of the spreadsheet from Columns F to AO. 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 with α = ½ (like we did in class). 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***.

|  |  |  |
| --- | --- | --- |
| Method | FC | MAD |
| Naïve |  |  |
| MA(**12**) |  |  |
| LR |  |  |
| ES(½) |  |  |

According to MAD, which forecast is the best bet for period 37?

**Extra Credit:** Explain what cells BD119 an BF119 are and where they came from.