

| Category           | Report Section                  | Criteria   | Points   |                 |
|--------------------|---------------------------------|--|----------|-----------------|
| Additive Points    |                                 |  |          |                 |
| Structure          | Executive Summary               | Comes first on report (easy point!)  | 1        |                 |
| Structure          | Executive Summary               | Short paragraph (3-4 sentences, and be quickly read in 20ish seconds)  | 1        |                 |
| Quality of writing | Executive Summary               | States the problem, e.g. "forecast acres burned..." as per the README file - should not be copying the README, but paraphrasing at the very least  | 1        |                 |
| Quality of writing | Executive Summary               | Does NOT say "the dataset I chose" or similar. Remember the AUDIENCE is not the GSIs/Professor, though we're grading it  | 1        |                 |
| Technical details  | Executive Summary               | Succinctly and correctly states only the final model - not the models that didn't make it  | 1        |                 |
| Technical details  | Executive Summary               | Correctly states what final model's forecasts imply for the problem.   | 1        |                 |
|                    |                                 |  | <b>6</b> | <b>Subtotal</b> |
| Quality of writing | Exploratory Data Analysis (EDA) | PLOT: of raw data  | 2        |                 |
| Quality of writing | Exploratory Data Analysis (EDA) | Discusses trend, or lack thereof   | 1        |                 |
| Quality of writing | Exploratory Data Analysis (EDA) | Discusses seasonality, or lack thereof   | 1        |                 |
| Quality of writing | Exploratory Data Analysis (EDA) | Discusses heteroscedasticity, or lack thereof  | 1        |                 |
| Technical details  | Exploratory Data Analysis (EDA) | Correctly identifies trend   | 1        |                 |
| Technical details  | Exploratory Data Analysis (EDA) | Correctly identifies seasonal period(s) (or frequencies) if present: j from periodogram is not the period, n/j is the period   | 1        |                 |
| Technical details  | Exploratory Data Analysis (EDA) | Correctly identifies heteroscedasticity or homoscedasticity  | 1        |                 |
|                    |                                 |  | <b>8</b> | <b>Subtotal</b> |
| Quality of writing | Signal Model (x2)               | Model description/explanation succinct and clear. It should not require reading twice! When in doubt, include an equation as your audience is mathematically literate  | 2        |                 |
| Quality of writing | Signal Model (x2)               | Describes the chosen model, not a travel log of all models tried.  | 2        |                 |
| Technical details  | Signal Model (x2)               | describes how signal model deals with the nonstationary pieces of the time series found in EDA   | 2        |                 |
| Structure          | Signal Model (x2)               | PLOT: demonstrates visually that the residuals/diffs/etc. are stationary (job is complete). Even better with a plot of data with the fitted values   | 2        |                 |
| Technical details  | Signal Model (x2)               | LOSES points if you claim stationarity is shown via ACF or PACF (this is the job of the residual plot)   | 2        |                 |
| Technical details  | Signal Model (x2)               | signal model appropriately addresses trend, if present   | 2        |                 |
| Technical details  | Signal Model (x2)               | signal model appropriately addresses seasonality, if present   | 2        |                 |
| Technical details  | Signal Model (x2)               | signal model appropriately addresses heteroscedasticity, if present (and if possible: VST doesn't solve heter. for stock data)   | 2        |                 |
| Structure          | ARMA Model (x2)                 | PLOT: ACF of each signal model residuals. Okay if this is listed in signal model section   | 2        |                 |
| Structure          | ARMA Model (x2)                 | PLOT: PACF of each signal model residuals. Okay if this is listed in signal model section  | 2        |                 |
| Quality of writing | ARMA Model (x4)                 | First explains choice of p/q/etc. This usually includes discussing ACF/PACF plots. (auto.arima is okay for one of the two ARMA models, but try to make sense of it)  | 4        |                 |
| Quality of writing | ARMA Model (x4)                 | PLOT: Second, visually shows that your choice fits with at least one of the following: sample ACF with dots for ARMA's theoretical ACF (can simply included on original ACF plot), Ljung box, etc. Note that this does not need to be the full set of sarima diagnostic plots. | 4        |                 |
| Quality of writing | ARMA Model (x4)                 | Then explains how the visualization shows that the chosen ARMA model fits well   | 4        |                 |
| Quality of writing | ARMA Model (x4)                 | Model name clearly and correctly stated somewhere, e.g. MA(1), AR(2), ARMA(0,2)x(1,3)[7], ARMA(1,1), etc.  | 4        |                 |
| Structure          | ARMA Model (x4)                 | ARMA models are given separate subsections (it's clear where the discussion of one ARMA model begins and the other ends)   | 2        |                 |
| Technical details  | ARMA Model (x4)                 | No differencing should be done during the ARMA modeling step: that's part of your signal model.  | 0        |                 |
| Technical details  | ARMA Model (x4)                 | Choices of p/q/etc. are defensible based on signal model residuals' ACF or other pursuits (auto.arima is okay for one of the two ARMA models, but try to make sense of it)   | 4        |                 |

|                    |                              |  |                    |
|--------------------|------------------------------|--|--------------------|
|                    |                              |  | <b>42 Subtotal</b> |
| Technical details  | Model Comparison/Selection   | Cross validation performed (required)  | 1                  |
| Quality of writing | Model Comparison/Selection   | Cross validation process clearly and succinctly described (e.g. "Cross validation was done on 40 different (non) overlapping testing datasets, each consisting of 10 years of data, beginning with the 1970-1979 window. Each was forecasted using a training dataset of all the data that occurred before the first testing observation") | 1                  |
| Structure          | Model Comparison/Selection   | Table of CV (and perhaps IC) results. (Should be formally formatted, named, and captioned)   | 2                  |
| Technical details  | Model Comparison/Selection   | Cross validation has no code errors: your CV value of one model shouldn't be 10x that of another   | 1                  |
| Quality of writing | Model Comparison/Selection   | State your criteria for choosing the best model (based on these CV/IC/etc.)  | 1                  |
| Quality of writing | Model Comparison/Selection   | Clearly state which model is chosen as the best one (that you'll use to forecast and describe in the Results section)  | 1                  |
| Technical details  | Model Comparison/Selection   | If AIC/BIC discussed, they are only compared when appropriate (when likelihoods are the same, which is probably only when the signal models are the same). Credit still given if there's no IC's and CV discussion is sufficient.  | 1                  |
|                    |                              |  | <b>8 Subtotal</b>  |
| Quality of writing | Results: mathematical model  | Variables/etc. are all defined: don't assume $W_t$ , $X_t$ , $Y_t$ are known to the audience. This section is easy to do clearly, and if done formally and well, can be understood by anyone from the mathematical sciences  | 1                  |
| Quality of writing | Results: mathematical model  | It will read a lot better not to use backshift notation, unless you're using a large MSARMA e.g. where ( $P>0$ , $p>0$ , and $P+p>2$ ) or ( $Q>0$ , $q>0$ , and $Q+q>2$ )  | 1                  |
| Technical details  | Results: mathematical model  | Variables are written using mathematical symbols and syntax, not texts nor any non-math special characters   | 1                  |
| Technical details  | Results: mathematical model  | Mathematical model written out correctly (suggestion: most people's models will be best displayed in two lines: one for signal model, one for ARMA model, connected via $X_t$ )  | 1                  |
| Quality of writing | Results: parameter estimates | Introduce your table, and point out some interesting things about the values.  | 1                  |
| Structure          | Results: parameter estimates | Table of parameter estimates, of both the signal model and ARMA model parameters (if they exist). This table may be included as a page 7 appendix, but only this table and its title/caption/etc. may be included on page 7  | 1                  |
| Structure          | Results: parameter estimates | No parameter is missing. Remember, all models should estimate $\sigma^2_W$   | 1                  |
| Technical details  | Results: parameter estimates | Variables are written using mathematical symbols and syntax, not texts nor any non-math special characters   | 1                  |
| Structure          | Results: forecasts           | PLOT: at least one plot of the forecast in RAW data scale. If using VST, feel free to include a VST scale also, but this is not required.  | 2                  |
| Technical details  | Results: forecasts           | Discussion of the forecast results/predictions and their implications for the dataset's problem (and discuss prediction intervals if they are on your plot via <code>sarima.for</code> or other function)  | 1                  |
|                    |                              |  | <b>11 Subtotal</b> |
|                    |                              | <u>For general section: 3 points for perfect, 2 points for up to a couple of errors, 1 point for frequent errors, and 0 point for filled with errors</u>   |                    |
| Structure          | General                      | Plots' axis labels are properly written (not <code>data\$fires</code> , etc.), capitalized   | 3                  |
| Structure          | General                      | Formally references plots and tables, e.g. "Figure 1", "Table 2". So when discussing a plot/figure/table, there should be no ambiguity as to which you are discussing (e.g. "the right panel of Figure 2"). Points lost if you reference a plot and it's not clear which...  | 3                  |
| Structure          | General                      | Plots are large enough for the points/lines/patterns are easily visible.   | 3                  |
| Structure          | General                      | Plots have formal names (e.g. Figure 1) and caption that clearly defines the figure (should be able to view the plot without reading the report body)  | 3                  |
| Structure          | General                      | Sections separated and appropriately/helpfully labeled. "Parametric + ARMA 1" is not appropriate, but "Parametric Signal with MA(3)" is. Models should be discussed in their appropriate sections/subsections.   | 3                  |
|                    |                              |  | <b>15 Subtotal</b> |
| Forecasts          | CSV                          | Submitted a file on bCourses   | 4                  |
| Forecasts          | CSV                          | File submitted in correct format (CSV, only one column, 10 rows)   | 4                  |
| Forecasts          | CSV                          | Comparison of mean-squared prediction error to others with same dataset. Top 1/3 will get 2 points, the middle third 1 point, and the bottom third 0 points.   | 2                  |
|                    |                              |  | <b>10 Subtotal</b> |

|                           |  |   |                  |  |
|---------------------------|--|---|------------------|--|
|                           |  |   | <b>100 TOTAL</b> |  |
|                           |  |   |                  |  |
| <b>Subtractive Points</b> |  |   |                  |  |
|                           |  | <u>For subtractive section: no points lost for perfect. 1 point for a couple of errors. 3 points for frequent errors; x10 for page limit</u>  | Limit            |  |
| Structure                 |  | 10 points lost per page over 6 page limit (except parameter estimates on appendix on page 7), up to 30 points   | 30               |  |
| Quality of writing        |  | Spelling, grammar, etc.   | 3                |  |
| Structure                 |  | Do not include code/raw output! This report should be formally formatted.   | 3                |  |
|                           |  |   |                  |  |
|                           |  |   |                  |  |
|                           |  |   |                  |  |
| <b>Advice</b>             |  |   |                  |  |
| Structure                 |  | Every figure included should be discussed in the text and connected to what your models. Else why is it there?  | 0                |  |
| Quality of writing        |  | Class-specific terms are explained: VST, q-step, etc., whereas ACF/PACF/ARMA are well known (though even for these, best practice is to write out the method then show the acronym, e.g. autocorrelation function (ACF). )  | 0                |  |
| Technical details         |  | The "underfit" models are clearly not "appropriate". Are you overfitting?   | 0                |  |
| Technical details         |  | Dickey-fuller test (you should explain null/alternative hypotheses), decomposition functions (define what we're looking at), and other techniques can be used, but these are all extra: you still must satisfy the other requirements within the 6 page limit. So if you do want to use these, be sure they are constructive to your paper! | 0                |  |
| Structure                 |  | No code need be submitted!  |                  |  |