Time Series Midterm Take Home Portion

Download the file *DallasCovidJune22.csv* from the Wall. This data contains the number of new cases found per day in Dallas, Texas up to the day of our test: June 22nd. There are three columns in this data set: Date, NewCases, NewCasesAdj.

1. Address condition 3 of stationarity with the appropriate plots and explanation. Please include you code as well.
2. Assuming stationarity (a questionable assumption) the top model with respect to AIC is an ARMA(1,1). This is mode is . We would like to assess this model on the basis of the ASE calculated with a horizon of 7. Please provide a plot and the ASE and your code.
3. Given that the AR factor in the model had a phi very close to 1, the fact that condition 1 of stationarity may be violated, and that the acf is very slowly damping to 0, we decide to fit a simple non-stationary model to this data as well: . We would like to assess this model on the basis of the ASE calculated with a horizon of 7. Please provide a plot and the ASE and your code.
4. Which model would you select only based on the ASE?
5. Notice that we used the adjusted data (NewCasesAdj). Plot the unadjusted data (New Cases) and identify why an adjustment was needed and what actual adjustment was implemented.

BONUS 1 (3 pts): Find a rolling window ASE for each model and compare them based on this metric. There are many variations of the rolling window ASE. For this one, use each model as it is written above. Let’s also have

BONUS 2 (2 pts): The CDC and the news seem to favor a 7-day trailing moving average to judge the trend that the virus cases are taking. This has huge consequences for businesses reopening, politics and the general psyche of nearly everyone in the world. The trailing moving average takes the average of the data point at time t and the 6 time points before it. Adapt the code for the centered moving average code that we studied and make a plot to show the 7-point trailing moving average. Is there evidence for concern that COVID 19 is making a resurgence in Dallas as of June 22?