STAT 520 – Homework 3B – Fall 2023

5) The daily prices of gold over 252 trading days in 2005 are in the `gold` object in the `TSA` package.
Type `library(TSA); data(gold); print(gold)` in R to see the data set.
(a) Plot the time series. What basic pattern do you see from the plot?
(b) Plot the time series of the differences of the (natural) logarithms of these data. Does this plot suggest
that a stationary model might be appropriate for the differences of the natural logarithms? Briefly explain.
(c) Plot the sample ACF for the differences of the logarithms of these data. Does this provide evidence
that the log-transformed gold prices follow a random walk model? Why or why not?

6) A data set of 57 consecutive measurements from a machine tool are in the `deere3` object in the `TSA`
package. Type `library(TSA); data(deere3); print(deere3)` in R to see the data set.
(a) Plot the time series. What basic pattern do you see from the plot? Might a stationary model be
appropriate for this plot?
(b) Using tools such as the ACF, PACF, and/or EACF, tentatively specify the type of model (AR, MA, or
ARMA) as well as the order(s) of the model.

7) A data set of 324 measurements of an industrial robot's positions are in the `robot` object in the `TSA`
package. Type `library(TSA); data(robot); print(robot)` in R to see the data set.
(a) Plot the time series. What basic pattern do you see from the plot? Might a stationary model be
appropriate for this plot?
(b) Using tools such as the ACF, PACF, and/or EACF, tentatively specify the type of model (AR, MA, or
ARMA) as well as the order(s) of the model.
(c) Use the best subsets ARMA approach to specify a model. Consider up to 8 AR terms and up to 8 MA
terms. Does the "best" subset ARMA model agree with the model you specified in part (b)?
(d) Repeat parts (a)-(c) on the **first differences** of the robot time series. Does this analysis suggest a
particular model for the original robot data? Briefly explain.