Lab Assignment 03

PSTAT 174/274

1. Consider the AR(2) process below:

$$X_t = 0.8X_{t-1} - 0.12X_{t-2} + Z_t \text{ with } Z_t \overset{\text{iid}}{\sim} N(0,1).$$

   (a) Express the processes in terms of the back shift operator, B.

   (b) Determine whether each process is causal and/or invertible. (Hint: use `polyroot()`).

   (c) We simulate 200 observations from this AR(2) model with the following code:

```
set.seed(1234)
ar2 <- arima.sim(model = list(ar = c(0.8,-0.12),sd = 1),n = 200)
```

   Plot the sample ACF and PACF.

   (d) Use the above simulation to **manually** construct the Yule-Walker estimates $\hat{\phi}_1, \hat{\phi}_2$, and $\hat{\sigma}_Z^2$. Also, use the pre-installed function `ar.yw()` for estimation.