STAT 673 name _____
December 2020

Final Exam

Show all work. Problem 1.

This Problem is a take-home problem for the final exam. You **may not** collaborate with *any* other person (whether in the class or not). You **may** use any reading material (class notes, books, etc.) you wish. Professor Bailey *will* answer questions.

(20pts) 1. Consider the model:

$$(1 - \phi B)(1 - B)Z_t = a_t$$

where a_t is a mean zero white noise process with constant variance σ_a^2.

(a) What is this time series model? Please give the order of the process.
(b) Show that this process can be written as:

$$Z_t = (1 + \phi)Z_{t-1} - \phi Z_{t-2} + a_t$$

(c) Let $|\phi| < 1$. Is the Z_t process stationary? Explain.
(d) Find the MA representation of this process. Give the ψ_j weights for $j = 0, 1, 2$.
(e) For $t = n$, find the l-step ahead forecast, $\hat{Z}_n(l)$ of Z_{n+l} for $l = 1, 2$. Give the recursion relationship for $l > 2$.
(f) Find the variance of the l-step ahead forecast error for $l = 1, 2$.
(g) Find the AR representation of this process. Give the π_j weights for $j = 0, 1, 2$.