1. Consider the ARIMA model $(1-1.4B+.49B^2)(1-B)z_t = (1-.5B)a_t$.
   (a) Find the coefficients $\psi_1, \ldots, \psi_6$ in the MA form of z_t.
   (b) Give a general expression of ψ_j for $j > 1$.
   (c) Express z_t in a truncated MA form with respect to the time origin $t = 3$.
   (d) Find the π weights in the infinite order AR form, $(1 - \sum_{j=1}^{\infty} \pi_j B^j)z_t = a_t$, and verify that $\sum_{j=1}^{\infty} \pi_j = 1$.
   (e) Find the variance and autocorrelation of $w_t = z_t - z_{t-1}$.

2. Consider $Z_t = z_t + b_t$, where $z_t = z_{t-1} + a_t$ with a_t a white noise, $\sigma_a^2 = 1$, and b_t is another white noise independent of a_t, $\sigma_b^2 = 2$. Show that Z_t is an IMA(0,1,1) process, and specify all its parameters.

3. Consider $Z_t = z_t + b_t$, where $z_t = \phi z_{t-1} + a_t$ is stationary with a_t a white noise, and b_t is another white noise independent of a_t.
   (a) Show that Z_t is an ARMA process and identify its orders.
   (b) Express the parameters of Z_t in terms of ϕ, σ_a^2, and σ_b^2.

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