1. Assume that 100 observations from an AR(2) model

    $(1 - \phi_1 B - \phi_2 B^2) x_t = z_t, \quad where \; z_t \sim N(0, \sigma_z^2)$, given the following

    $\rho_1 = 0.3571 \; and \; \rho_2 = -0.2214.$ Use the method of moments to estimate $\phi_1 \; and \; \phi_2$.

    (10)

2.

3. For the MA(2) model : $x_t = (1 - 0.7B + 0.5B^2) z_t$.

    a. Check if it is stationary or invertible.   (04)
    b. find $\rho_k \; for \; k = 1, 2 \& 3$ (06)

    c. find $\phi_{kk} \; for \; k = 1, 2 \& 3$ (05)

4. A time series x_t follows the following ARMA model: $x_t = x_{t-1} + \dfrac{3}{4} x_{t-2} - \dfrac{3}{4} x_{t-3} + z_t + \dfrac{2}{5} z_{t-1}$

    where $z_t \sim N\left(0, \sigma_Z^2\right)$.

    a. Classify this model as ARIMA $(p, d, q) \times (P, D, Q)_s$ process

        (i.e. find p, d, q , P, D, Q).   (04)

                                                                                     (03)

    b. Is x_t stationary? Give reason.   (03)

    c. Is x_t invertible? Give reason.