

1.  $X_t = \rho X_{t-1} + \varepsilon_t$ ,  $-\infty < t < \infty$ ,  $|\rho| < 1$ ,  $\varepsilon_t \sim iid$ ,  $E\varepsilon_t = 0$ ,  $E\varepsilon_t^2 = \sigma^2$ .

(a) find an estimator for  $\sigma^2$ .

2. Let  $X_t = \varphi_1 X_{t-1} + \varphi_2 X_{t-2} + \varepsilon_t$ ,  $1 \leq t \leq n$ .

(a) find the least squares estimates for  $\varphi_1$  and  $\varphi_2$ .

We need to minimize

$$\sum_{t=1}^n (X_t - \varphi_1 X_{t-1} - \varphi_2 X_{t-2})^2$$