

TS Module 3 Trends

(The attached PDF file has better formatting.)

*Time series practice problems means and correlations*

\*Question 3.1:  $\text{Var}(\bar{y})$

A white noise process  $Y_t = \epsilon_t$  has 200 observations, with  $\gamma_0 = 1$ .

What is  $\text{Var}(\bar{y})$ ?

- A. 0.001
- B. 0.002
- C. 0.005
- D. 0.010
- E. 0.050

Answer 3.1: C

$$\gamma_0 = \sigma^2 = 1.$$

$$\text{Var}(\bar{y}) = (1/200)^2 \times 200 \times \sigma^2 = 1/200 = 0.005$$

(See Cryer and Chan page 28)

$$\text{Var}(\bar{y}) = (\gamma_0 / n) \times [(1 + 2 \times \rho_1 \times (n-1)/n)] = 1/200 = 0.00500$$

\*Question 3.2: Autoregressive process

A stationary time series  $Y$  of 300 observations has  $\rho_k = (1/2)^{|k|}$  for all  $k$  and  $\gamma_0 = 1$ .

What is  $\text{Var}(\bar{y})$ ?

- A. 0.01
- B. 0.03
- C. 0.05
- D. 0.15
- E. 0.30

Answer 3.2: A

$$\text{Var}(\bar{y}) \approx \frac{(1 + \phi) \gamma_0}{(1 - \phi) n}$$

$$= (1.5)/(0.5) \times 1/300 = 0.01000$$