

ECO 318, Practice Problems: Difference and Differential Equations

Consider the following difference equation:

$$y_t = by_{t-1} + e_t \quad (1)$$

where e_t is a random shock.

1. Represent y_t as a function of y_0 and a series of random shocks.
2. Represent (1) as a forward looking difference equation.

Consider the following system of differential equations:

$$\dot{\pi} + \frac{1}{2}\pi_t + \alpha y_t = 0 \quad (2)$$

$$\dot{y} - \frac{1}{10}\pi_t + \frac{1}{5}y_t = 0 \quad (3)$$

3. For what, if any, values of α is (2)-(3) a stationary system?

Consider the following system of difference equations:

$$\pi_t + \frac{1}{2}\pi_{t-1} + \alpha y_{t-1} = 0 \quad (4)$$

$$y_t - \frac{1}{10}\pi_{t-1} + \frac{1}{5}y_{t-1} = 0 \quad (5)$$

4. For what, if any, values of α is (4)-(5) a stationary system?