Systems of Difference Equations

Mathematics for Economists, Fall 2024-25

Homework Exercises Set 3

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1 Express the following n-order linear difference equations as a first-order linear $(n \times n)$ difference equations systems:

a) $y_{t+3} + 5y_{t+2} - 4y_{t+1} + y_t = t$

b) $y_t + y_{t-2} + 0.25y_{t-4} = 0$

c) $y_{t+4} + 5y_{t+2} + 4y_t = 0$

2 Solve the following first order difference systems, using the direct method:

a)

$x_{t+1} = -x_t + y_t - 8$

$y_{t+1} = -0.3x_t + 0.9y_t + 4$

b)

$x_{t+1} = x_t - y_t$

$y_{t+1} = x_t + 3y_t$