

## Systems of Difference Equations

Mathematics for Economists, Fall 2023-24

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)**

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

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