

1. Solve each of the following difference equations. Also, solve for the steady state if it exists and indicate whether or not y_t converges to the steady state.

(a) $y_{t+1} = 0.5y_t + 10, \quad y_0 = 25.$

(b) $y_{t+1} = y_t + 2, \quad y_0 = 4$

(c) $y_t = 4y_{t-1} - 12, \quad y_0 = 5$

2. In the labor market for new engineering graduates, demand depends on the current wage. Demand is given by:

$$w_t = \alpha - \beta E_t, \quad \alpha > 0, \beta > 0$$

where w_t is the wage at time t and E_t is the number of new engineers at time t . The supply depends on the wage in the previous period (since the decision to major in engineering occurs in the time period before new engineers enter the labor market.) Supply is given by

$$w_{t-1} = \gamma + \delta E_t, \quad \gamma > 0, \delta > 0.$$

- (a) Show that

$$w_{t+1} = \frac{-\beta}{\delta} w_t + \frac{\alpha\delta + \beta\gamma}{\delta}$$

describes the time path of the wage in this market.

- (b) Find the steady-state wage.
 (c) What restriction on the parameters guarantees that the wage will converge to its steady-state value?
 (d) What is the nature of the convergent time path? Is it oscillating, monotonic, chaotic, or indeterminate?