Economics 511 Problem Set 19

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1. (Ex. 1, page 798) For the difference equation

$$y_{t+1} = \frac{3}{16} + y_t^2$$

find the steady-state points, determine whether they are locally stable, and sketch a phase diagram to investigate the global stability.

2. (Ex. 4, page 798) For the difference equation

$$y_{t+1} = 1 + \frac{3}{4y_t}$$

find the steady-state points, determine whether the one in the positive quadrant is locally stable, and sketch a phase diagram to investigate the global stability.

3. (The square-root machine.) For the difference equation

$$y_{t+1} = \frac{1}{2}\left(y_t + \frac{c}{y_t}\right), \qquad c > 0$$

find the steady-state points, determine whether the one in the positive quadrant is locally stable, and sketch a phase diagram to investigate the global stability. Why is this difference equation called the square-root machine?

4. (Related to Ex. 6, page 808) Let the aggregate consumption function be

$$C_{t+1} = a + bY_t^{\alpha}, 0 < \alpha < 1; 0 < b < 1$$

where C is aggregate consumption and Y is aggregate income. Assuming that

$$Y_t = C_t + I$$

where I is a constant level of investment, derive the difference equation for aggregate consumption. Draw a phase diagram and determine the behavior of C_t. In particular, does it converge to a steady-state value or not?