Cobwebbing, Equilibria and Stability

Algorithm (Cobwebbing). Using Cobwebbing to find the solution of $m_{t+1} = f(m_t)$ with initial condition m_0:

1. Graph the updating function ($f(m_t)$) and the diagonal ($m_{t+1} = m_t$).

2. From the initial condition in the horizontal axis, go vertically to the updating function and over to the diagonal.

3. From the diagonal go vertically to the updating function and over the diagonal again. Repeat this step as many times as needed to find the pattern.

4. Sketch the solution at $t = 0, 1, 2, \ldots$ and so forth.

Definition (Equilibrium): A point m^* is called equilibrium of the discrete-time dynamical system $m_{t+1} = f(m_t)$ if

$$m^* = f(m^*). \tag{1}$$

Definition (Stability): An equilibrium m^* is called **stable** if the solutions that start near m^* stay near or approach m^*. If the solutions that start near m^* move away from it, then m^* is an **unstable** equilibrium.