Instructions: This quiz is closed books and closed notes. You may use calculators. Work that is erased or crossed out will not be graded.

1. [Section 1.26 Ex. 9,27] (6 pts) Let \( m_{t+1} = -0.5m_t + 3 \) and \( m_0 = 4 \). Graph the updating function associated with this system and then cobweb for three steps. Clearly label your graph, including axes and cobwebbing points. What is the long-term behavior of this system?

2. (4 pts) Algebraically find the equilibria for the discrete-time dynamical system \( w_{t+1} = aw_t + 3 \), where \( a \) is a parameter. Is there a value of \( a \) for which there is no equilibrium?

Extra Credit: The article mentions the Hidden Markov Model as a tool invented by defense institute code breakers in the 1960s. How is the Hidden Markov Model used in genomics?