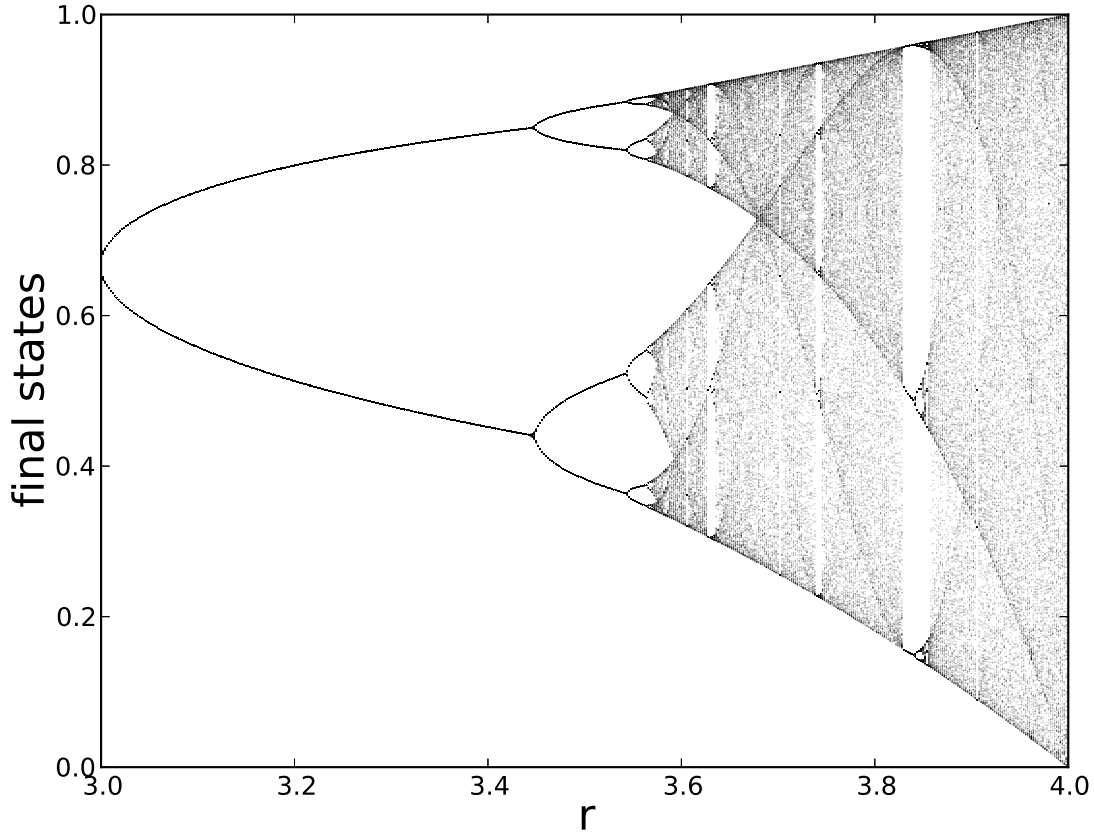
Solutions to Quiz 1, Unit 5.2



The bifurcation diagram for the logistic equation is shown above. Use this bifurcation diagram to determine the behavior of the logistic equation for the following r values.

1. $r = 3.05$

   A. Periodic with period 1
   B. Periodic with period 2
   C. Periodic with period 4
   D. Aperiodic with x ranging from about 0.1 to 0.95

   Solution: The correct answer is **B**. There is a period-2 attractor. A line drawn vertically from 3.05 could give a final-state diagram with two dots.

2. $r = 3.50$

   A. Periodic with period 1
   B. Periodic with period 2
   C. Periodic with period 4
   D. Aperiodic with x ranging from about 0.1 to 0.95

Solution: The correct answer is **C**. There is a period-4 attractor. A line drawn vertically from 3.5 would give a final-state diagram with four dots.

3. $r = 3.6$

   A. Periodic with period 4

   B. Aperiodic with x ranging from about 0.1 to 0.95

   C. Aperiodic with x ranging from about 0.35 to 0.9

   D. Aperiodic with x ranging from about 0.35 to 0.9 but with a gap in the middle.

Solution: The correct answer is **D**. The orbits are aperiodic ranging from roughly 0.35 to 0.9. However, there is a gap in the middle where orbits do not go. You can see this if you make a time series plot for the logistic equation with $r = 3.65$. There are no orbits between roughly 0.6 and 0.8.