Answers to Homework 6.2: 1,2,3,4,5, 27,28,29

1. **Any interest?** At the end of one year you will have \((1.03)(1000) = 1030\). After two years you’ll have \((1.03)^2 (1000) = 1060.90\). After five years, you’ll have \((1.03)^5(1000) = 1159.27\).

2. **Urban expansion.** In 2008 the population of Starburg is expected to be \((1.07)^4 (10,000) = 13,108\).

3. **Pre-sushi.** Population density is the ratio of the actual population to the maximum sustainable population. When there are 3000 fish, the population density is 0.5. When there are 4800 fish, the density is 0.8. When there are 7500 fish, the density is 1.25.

4. **A booby trap.** If \(P\) denotes the actual population of boobies, then \(P/50,000 = 0.675\). Thus, \(P = 33,750\).

5. **Too many.** The average number of birds per square yard. Is 50,000/17,000 = 2.94, or about 3 birds per square yard.

27. **Fibonacci.** You input the first two numbers and add them. After that, you take the output and add it to the previous number to get the new output. The difference between the two columns grows quickly. After 20 iterations, they differ by 13,530, but the ratio between the two columns converges to 2.236… . So, the second column is always just a little more than twice the first. Any description like this will be OK. The first few entries in the columns should be: 1,1,2,3,5,8,13,21,34, etc. for the first column; 1,3,4,7,11,18,29,47,76,123, etc.

28. **Fibonacci again.** The limiting ratio in both columns is the Golden Mean. In fact, this limiting ratio is independent of the starting seeds. To convince yourself, you might try wildly different starting seeds: Try negative numbers, fractional numbers, irrational numbers, and so on.

29. **Alien antenna.** After four generations, you have \(2^4 = 16\) endpoints; after \(n\) generations, \(2^n\) endpoints.