Solutions for Partial Review: Intro to Recursion

1. 17, 14, 11
This sequence is an arithmetic sequence.
The first term is 29. Each succeeding term is 3 less than the preceding term.

2. 29, 47, 76
This sequence is a Fibonacci sequence.
The first term is 3 and the second term is 4. Each succeeding term is the sum of the two previous terms.

3. $\frac{256}{5}, \frac{1024}{25}, \frac{4096}{125}$
This sequence is a geometric sequence.
$$\begin{cases} a_1 = 125 \\ a_n = \frac{4}{5} a_{n-1} \end{cases}$$

4. 67, 131, 259
This sequence represents mixed recursion.
$$\begin{cases} a_1 = 5 \\ a_n = 2a_{n-1} - 3 \end{cases}$$

5. 30, 37, 45
This sequence is not one of our 4 identified sequences.
$$\begin{cases} t_1 = 9 \\ t_i = t_{i-1} + i - 1 \end{cases}$$

6. $a_{13} = \frac{24}{7}$ and $a_{83} = \frac{4}{7}$

7. $M_{13} = \frac{2653109}{512}$ and $M_{83} = 1.100 \times 10^{16}$

8. 8 12 18 27

9. 15 26 37 48 59

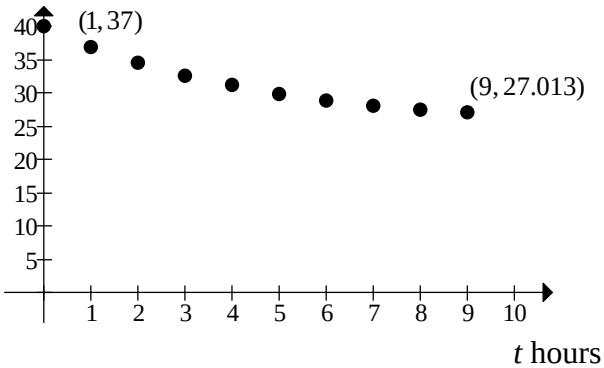
10. a) let M_t = the amount of medicine in the body (mg) after *t* hours
$$\begin{cases} M_0 = 40 \\ M_t = 0.8M_{t-1} + 5 \end{cases}$$

b)

t (hours)	0	1	2	3	4
M_t (mg)	40	37	34.6	32.68	31.144

c) The fifth term of the sequence indicates that the patient has 31.144 mg of the medicine in his or her body after 4 hours.

d) M_t, medicine (mg)



The sequence of dots does not accurately represent the amount of medicine in the patient's body since the graph is a discrete set of points. However, the level of medicine in the patient's body is a continuous function of time. That is, at any given time, even some portion

of an hour, the patient has some level of medicine present. Even connecting the dots with a smooth decreasing curve would not necessarily represent the situation well since the level of medicine present in the body would probably spike a bit upon administering the new dose of medicine each hour.

e) $M_{12} = 26.031$ and $M_{13} = 25.825$

The patient has less than 26 mg of the medicine in his or her body after 13 hours.

f)

t (hours)	0	10	20	30	40	50
M_t (mg)	40	26.611	25.173	25.019	25.002	25.0002

Over time, the level of medicine in the patient's body approaches 25 mg.