Medication Regimen

A person takes 5 mg of Lexapro[®] once per day for depression. Every 24 hours, the patient retains 98% of the drug, eliminating 2% through the liver and kidneys. If D_n is the amount of medication in the person's body immediately after the *n*th dose, where every dose is 24 hours apart, then we can write $D_1 = 5$.

Set up your grapher as follows. Then press ENTER repeatedly.

| NORMAL | FLOAT | AUTO | REAL | RADIAN | MP | Î |
|--------|---------------|------|------|--------|----|---|
| 5 | | | | | | _ |
| . 98Aı | 1s + 5 | • | | | | |

(a) Complete the boxes to find the following. Report each to 0.1 mg.

- i) the number of mg of drug, D_2 , in the patient's body immediately after the second dose of 5 mg (assuming it is taken 24 hours after the first dose).
- ii) the number of mg of drug, D_3 , in the patient's body immediately after the third dose of 5 mg (assuming it is taken 24 hours after the second dose).
- iii) the number of mg of drug, D_4 , in the patient's body immediately after the fourth dose of 5 mg (assuming it is taken 24 hours after the second dose).

| <i>n</i> (Number of doses, each taken every 24 hours apart) | D_n (mg) | Expanded form |
|--|----------------------|---|
| 1 | $D_1 = 5 \text{ mg}$ | $D_1 = 5$ |
| 2 | $D_2 = $ mg | $D_2 = 0.98D_1 + \texttt{S} = (0.98 + \texttt{S})$ |
| 3 | $D_3 = $ mg | $D_3 = 0.98D_2 + $ (5) = 0.98(0.98 + (5) + (5) |
| | | $= 0.98^2 \cdot 100000000000000000000000000000000000$ |
| 4 | $D_4 =$ mg | D ₄ = |

(b) Suppose the person takes 5 mg of the drug for 4 weeks, i.e., 28 days, where every dose is 24 hours apart.

- i) What is the amount of medication D_{28} , in the person's body immediately after the 28th dose? _____ mg (Report to the nearest whole number of mg.)
- ii) Write a series to represent the amount of medication, D_{28} , in the person's body immediately after the 28th dose.



- (c) You can solve for the stabilization point for the person's medication regimen by setting $D_n = 0.98D_{n-1} + 5$. When stabilization occurs, we have $D_n = D_{n-1}$. If stabilization occurs at *w* mg, then w = 0.98w + 5. Solve for *w*.
- (d) In the equation w = 0.98w + 5, replace 0.98 by the variable r and 5 by the letter a. Then report w for the general case. What are we assuming about the value of r in this situation?