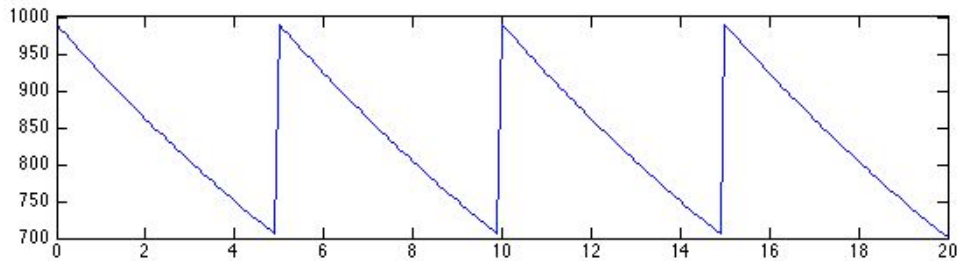


Math 151 – Sample Final Exam 2015 Answers – Louis Gross

1. (a) fraction which decays between each dose = $1 - \exp(-5 \ln(2) / 10) = .2929$
 (b) effective range is 700 mg to 1050 mg, so if b is periodic dose then equilibrium amount in body before each dose is $b/(1-a)$ where $1-a = .2929$ and we want $a*b/(1-a) = 700$ so $b=290$ mg
 (c) bolus dose = $700 + 290 = 990$ mg and amount left just before dose is 700 mg
 (d)



2. (a) Each year 40% of Ph is lost so 60% remains from previous year which is why the $.6 x_n$ term is there. The + 50 term arises from the addition of 50 g of Ph each year.
 (b) $x_n = 125 - 65 (.6)^n$
 (b) $x_3 = 111$ kg and in the long term there will be 125 kg of Ph

3. $x_n = 6.5 (3^n) - 2.5$

4. (a) $2/5$ (b) 0

5. (a) $M_L = 100 D_S^2$
 (b) $M_A = 4 M_B$

6. (a) $\begin{bmatrix} 0 & 8 & -2 \\ -1 & 15 & -6 \\ 14 & 6 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 6 \\ 19 \end{bmatrix}$

7. H = event had heart attack, L= event was lightheaded

(a) $P(L) = P(L|H)P(H) + P(L|\bar{H})P(\bar{H}) = .34$ (b) $P(H|\bar{L}) = \frac{P(\bar{L}|H)P(H)}{P(\bar{L})} = .182$

8. (a) 42% (b) frequency = .3

9. (a) .7 (b) .5 (c) .3

$$10. \text{ (a) } \begin{bmatrix} J \\ A \end{bmatrix}_n = \begin{bmatrix} 2 & 9 \\ 1/3 & 0 \end{bmatrix}^n \begin{bmatrix} J \\ A \end{bmatrix}_0 \quad \text{(b) } \begin{bmatrix} J \\ A \end{bmatrix}_2 = \begin{bmatrix} 2 & 9 \\ 1/3 & 0 \end{bmatrix}^2 \begin{bmatrix} 10 \\ 1 \end{bmatrix} = \begin{bmatrix} 88 \\ 29/3 \end{bmatrix}$$

$$\text{(c) } \lambda = 3 \quad \text{(d) } J : A = 9 : 1$$