PHA 5127 Homework – 1 Due – September 9th

1) The table1 shows the serum concentration profiles of a certain drug in patient X. Please specify the units for the Pk parameters to get full credit.

a) Determine if the elimination process is a first order or a zero order process. (Plot on a graph paper) [1]

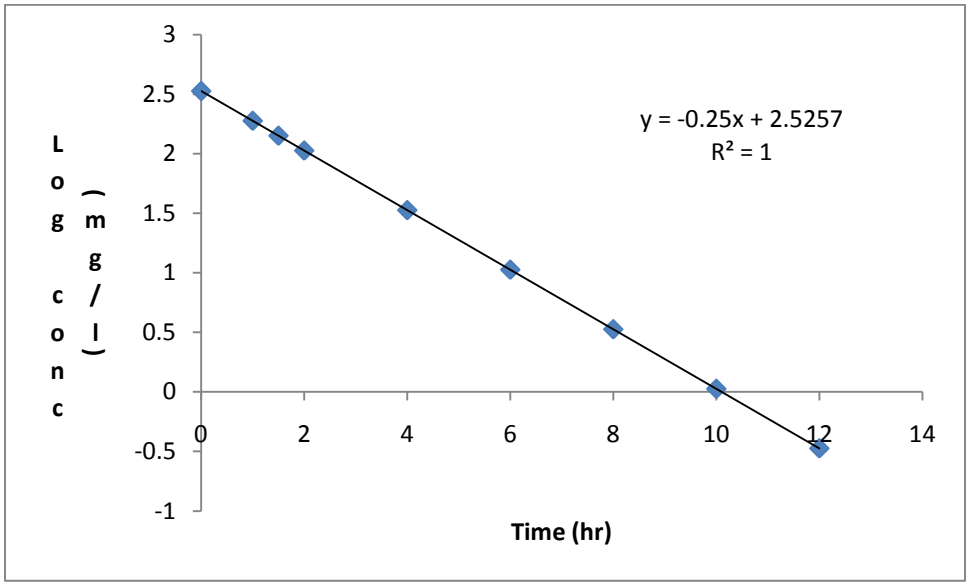
b) Calculate Ke, the first order elimination rate constant. [1]

c) Calculate AUC 0-tlast and AUC 0-inf by trapezoidal rule. [2]

d) Calculate the concentration of the drug X in serum at time 5hr.[1]

time(hr)	conc (mg/l)
0	12.50
1	9.74
1.5	8.59
2	7.58
4	4.60
6	2.79
8	1.69
10	1.03
12	0.62

Solution



a) It is clear from the figure that the ln conc vs time is a straight line. So the elimination process is a first order process.

b) The value of ke is 0.25 hr-1

c) The AUC(0-12hr) is 48.16 mg*hr/L

The AUC(0-inf) is 50.64 mg*hr/L

d) Using the equation $C = C0 * \exp(-ke * t)$

C0 = 12.5mg/L , ke = 0.25hr-1 ; C(5hr) = 3.58mg/L

Q2 Derive the equation $\mathrm{ke} = 0.693/\mathrm{t}_{1/2}$ for an i.v. bolus one compartment body model. [2]

Solution:

Substitute C = C0/2 in the equation $C = C0 * \exp(-ke * t)$ and solve for the relationship between ke and $t_{1/2}$

True or False

a) When the change in amount of the drug in the body is related to the amount by the following equation $\frac{dX}{dt} = -Ke * X\text{^}0$, where X is the amount of the drug at a given time t, then we say the elimination is a zero order process. (T/F) [1]
b) Drugs with a low volume of distribution have a narrow therapeutic window. (T/F) [1]
c) When whole blood is collected in a heparinized tube and then centrifuged, the supernatant that is obtained is plasma. (T/F) [1]