PHA 5127 – Fall 2003

Homework # 1

1. After a 500mg i.v. bolus injection of a drug, the following data were collected.

time / h	conc. µg/mL
1	72
2	51
3	33
4	20
6	14
8	9
10	4

   a) Plot the data. Is the drug eliminated by a first-order or zero-order process?

   b) Calculate the elimination rate constant.

   c) What is the concentration at t = 0 hours?

   d) Calculate the volume of distribution.

   e) Calculate the $AUC_{0-\infty}$ by trapezoidal rule.

2. What is the difference in distribution of drugs into organs such as the heart and the lung compared to fat tissue and bone? Explain.

3. 70-90% of quinidine is bound to plasma albumin and alpha-1-acid glycoprotein. In patients with chronic liver disease plasma protein binding is decreased by 20%. How will the volume of distribution change? (Use a plasma volume of 3 L and a tissue volume of 38 L. The fraction unbound in tissue is 70%.)

4. Given that a drug follows linear one compartment pharmacokinetics, with $t_{1/2}$ = 4.1 hours and Vd = 29 L, calculate a suitable i.v. bolus dose to maintain plasma concentrations of the drug above 4 mg/L for 12 hours. What is the initial plasma concentration?