PHA5127 – Fall 2006
Homework #5 (10 points)

Please show all your calculations. Points will be deducted for answers with no or incorrect units!

1. Benjamin is given a single i.v. bolus injection of Drug A. Below is the information provided on the patient, the drug, and the therapy:

Patient Age (yrs)	45
Patient Height	5 feet 10 inches
Patient Weight (kg)	90
Patient Gender	Male
Dose (mg/kg)	10
Therapeutic range (μg/mL)	0.9 to 5.7

Time (hrs)	Plasma Concentration (μg/mL)
0.5	5.0
1	4.5
3	2.9
6	1.4
12	0.4

   Assuming no loading dose is needed, devise a patient compliant dosing regimen for Benjamin for Drug A. (4 points)

2. For the following scenarios (in respect to question 1) for a multiple dose i.v. bolus therapy, determine what will happen (increase/decrease/stays the same) to the peak steady-state plasma concentration ($Cp_{max,ss}$) and the accumulation factor (r_{ss}) (0.5 points for each; 4 points total):

   a) The half-life ($t_{1/2}$) doubles but the total clearance (Cl) stays the same.

   b) The initial plasma concentration (C_o) is halved but the volume of distribution (V_d) stays the same.

   c) The number of doses/day is halved.

   d) A patient with liver failure taking a drug that is cleared 60% hepatically (as oppose to a normal patient).

3. Fill in the blanks. Please select the best answer from the options given (0.5 points each; 2 points total):

   a) Assuming that the dose and the half-life of Drug A and Drug B are the same, Drug A has twice the AUC than that of Drug B, so the initial plasma concentration for Drug A is _____ (higher/lower/the same as) that of Drug B.

b) In looking at the clearance of a drug with a metabolite, if the elimination rate of a parent drug is much smaller than the elimination rate of a metabolite (i.e. $k_e \ll k_e^M$), then the half-life of the metabolite is _____ (larger/smaller/the same as) the half-life of the parent drug.

c) In a one compartment body model, the distribution of an i.v. bolus administered drug occurs _____ (over a period of time/immediately).

d) For a drug that follows a first-order elimination, one compartment body model, saturation of enzymes or transporters _____ (does/does not) occur.