1. A new antibiotic drug was given in a single intravenous bolus of 4 mg/kg to five healthy male adults ranging in age from 23 to 38 years (average weight 75 kg). The pharmacokinetics of the plasma drug concentration-time curve for this drug fits a one-compartment model. The equation of the curve that best fits the data is:

$$Cp = 78 \cdot e^{-0.46*t}$$

Determine the following (assume units of microgram/ml for Cp and hr for t):

1. What is the $t^{1/2}$?
2. What is the Vd?
3. What is the plasma level of the drug after 4 hours?
4. How much drug is left the body after 4 hours?
5. Assuming the drug is no longer effective when levels decline to less than 2 µg/ml .. when should you administer the next dose?

2. A drug has an elimination $t_{1/2}$ of 6 hours and follows first order kinetics. If a single 200 mg dose as given to an adult male patient (68 kg) by IV bolus injection. What percent of the dose is lost in 24 hours?

3. If the amount of drug in the body declines from 100% of the dose (IV bolus injection) to 25% of the dose in 8 hours. What is the elimination half-life for this drug? (assume first order kinetics).

4. A 70 kg volunteer is given an intravenous dose of an antibiotic, and serum drug concentrations were determined at 2 hours and 5 hours after administration. The drug concentrations were 1.2 and 0.3 µg/ml, respectively. What is the biologic half-life for this drug, assuming first order kinetics?

5. A new drug was given in a single intravenous dose of 200 mg to an 80 kg adult male patient. After 6 hours, the plasma drug concentration of the drug was 1.5 mg/100 ml of plasma. Assuming that apparent Vd is 10% of body weight, compute the total amount of drug in the body fluids after 6 hours. What is the half-life of this drug?

A 50 kg woman was given a single IV dose of an antibacterial drug at a dose level of 6mg/kg. Blood samples were taken at various time intervals. The concentration of the drug (Cp) was determined in the plasma fraction of each blood sample and the following data were obtained:

t (hr)	Cp (µg/ml)
0.25	8.21
0.50	7.87
1.00	7.23
3.00	5.15
6.00	3.09
12.0	1.11
18.0	0.40

a) What are the values for Vd, Ke and $t_{1/2}$ for this drug?

b) This antibacterial agent is not effective at a plasma concentration of less than 2µg/ml. what is the duration of activity for this drug?

c) How long would it take for 99.9% of this drug to be eliminated?

d) If this dose of the antibiotic were doubled exactly, what would be the increase in duration of activity?

7. A single IV bolus injection containing 500 mg of cefamandole nafate (Mandole, Lilly) is given to an adult female patient (63 years, 55kg) for a septicemic infection. The apparent volume of distribution is 0.1 L/kg and the elimination half life is 0.75 hour. Assuming the drug is eliminated by first order kinetics and may be described by a one compartment model, calculate the following:

A. The Cp^0
B. The amount of drug in the body 4 hours after the dose is given.
C. The time for the drug to decline to 0.5 µg/ml, the minimum inhibitory concentration for streptococci.

8. A drug has an elimination half-life of 8 hours and follows first order elimination kinetics. If a single 600 mg dose is given to an adult female patient (62 kg) by rapid IV injection, what percent of the dose is eliminated (lost) in 24 hours. Assuming the apparent Vd is 400 ml/kg, what is the expected plasma drug concentration (Cp) at 24 hours postdose?

9. Procainamide is a drug that has an elimination half life = 3.2 hours, volume of distribution = 1.8 L/kg and MEC of 2 µg in plasma. What is the minimum dose of the procainamide was given intravenously as bolus that will maintain effective plasma concentration for a period of 5 hours?

10. Two different drugs were administered on different occasions in different doses to the same subject by intravascular bolus manner of administration and the $t_{1/2}$ of the two drugs were determined:

Dose	Drug A (hours)	Drug B (hours)
40	10	3.5
60	15	3.5
80	20	3.5

a) Which of the two drugs is eliminated by first order process? Give brief explanation.

b) If a 10 mg dose of the drug that is eliminated by first order peocess was administered to the same patient, how much time would be required to eliminate 7 mg of the drug?