1. A 45 year old male patient weighing 80 kg with a subtherapeutic theophylline concentration of 3 mg/L is admitted to the hospital for treatment. Based on average pharmacokinetic parameters \( V_d = 0.5 \text{ L/kg}, t_{1/2} = 8 \text{ hr} \), calculate an i.v. bolus loading dose and a maintenance dose (i.v. infusion) to increase the concentration to 13 mg/L.

2. The plasma concentration one hour after an i.v dose of gentamycin was 7.9 mg/L. After 6 hours, the concentration was 3.2 mg/L. What would be the concentration 10 hours after the dose?

3. A 55 year old man weighing 80 kg is given a 750 mg theophylline dose by i.v. bolus injection every 6 hours. Assume that the volume of distribution is 0.5 L/kg and that the \( t_{1/2} = 7.5 \text{ hr} \). Predict the steady state peak and trough concentrations.

4. Calculate the extraction ratio of phenybutazone in a 70 kg patient, given the following information: liver blood flow, 1500 mL/min; half-life, 50 h; \( V_d \), 0.1 L/kg; no non-hepatic elimination.

5. A patient is admitted with an acute theophylline overdose. A serum level is measured at 45 µg/ml. Assuming an 8 hour half-life and no further drug absorption, how long dose it take for the serum level to drop to the upper limit of the therapeutic range (20 µg/ml)?