1. A 55kg, 60-year-old male is hospitalized for a ruptured duodenal diverticulum that was surgically repaired. Before the surgery the patient is put on a short-term infusion (0.5h) of aminoglycosides.

- The desired steady-state peak (one hour after the end of the infusion) and trough values (at the end of the dosing interval) are: \( C_{\text{max}} = 6 \text{mg/L}, C_{\text{min}} = 1 \text{mg/L} \)
- Population estimates for CL (=2.4L/h) and Vd (=0.25L/kg).
- During the first infusion blood samples are taken 1 and 3 hours after the stop of the infusion to verify that the proper dosing regimen was selected. Plasma concentrations were 4.8mg/L and 2.8mg/L one and three hours after stop of the infusion, respectively

A. Calculate CL, Vd and \( k_e \) considering the population pharmacokinetic estimates.

B. Calculate a dosing regimen that would achieve the desired steady-state peak (\( C_{\text{max}}=6 \text{mg/L} \)) and trough (\( C_{\text{min}}=1 \text{mg/mL} \)) one hour after the end of the infusion and at the end of the dosing interval, respectively.

C. Calculate the ‘actual’ \( k_e \) based on the two blood levels. Is it the same as the population estimate? What should you do?

D. Calculate the new clearance for the patient.

E. Calculate the new dosing interval.

F. Calculate the recommended dose for the ‘actual’ \( k_e \).

G. Calculate the trough level at steady-state.

2. R.B. is a 30-year-old, 70 kg female with a serum creatinine of 0.9 mg/dL. An initial gentamicin dose of 100mg was infused i.v. over 30 min. Calculate the plasma concentration of gentamicin one hour and 7 hours after the infusion was started. (\( V_d=0.25L/kg, CL=CL_{\text{Cr}} \))