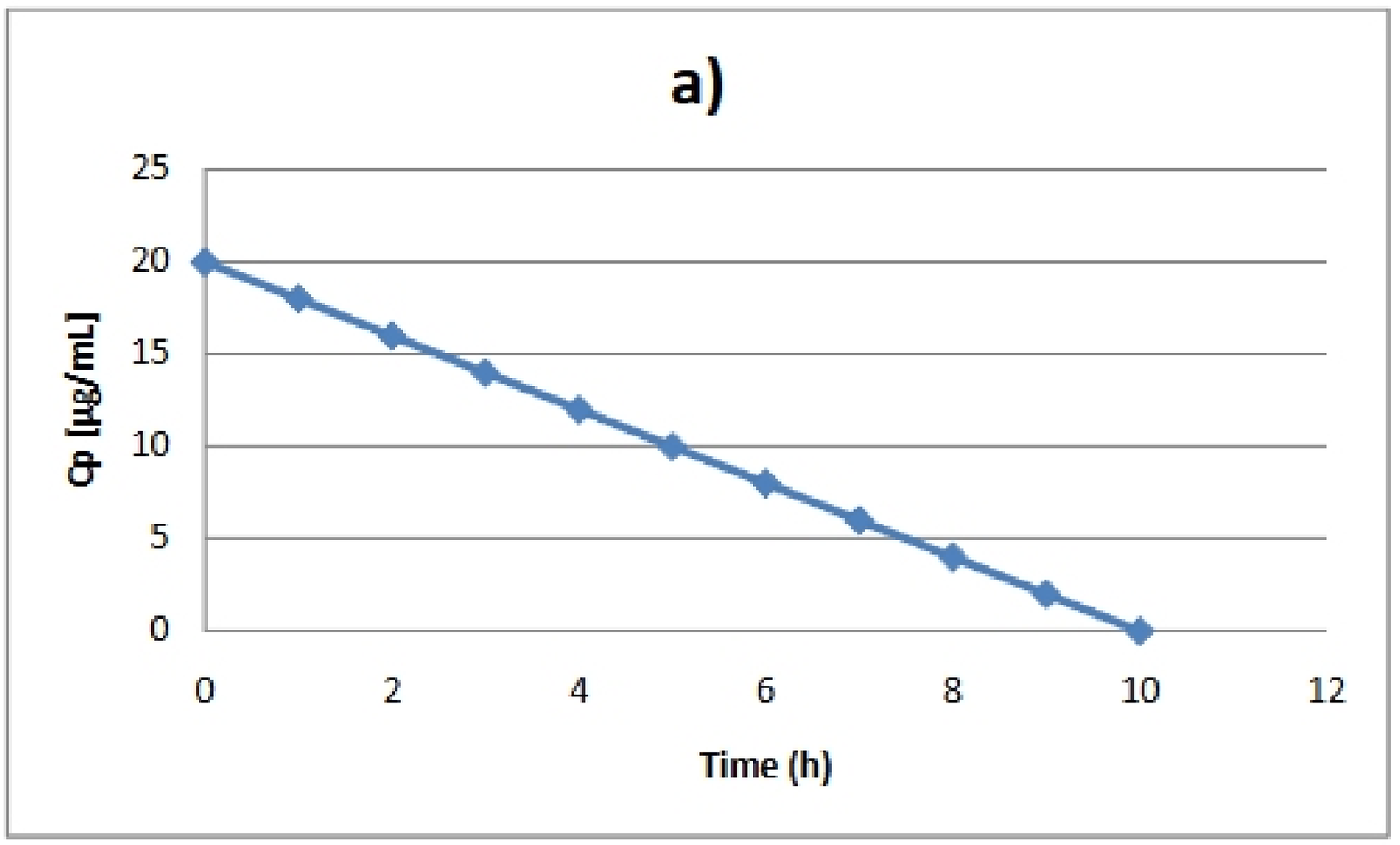
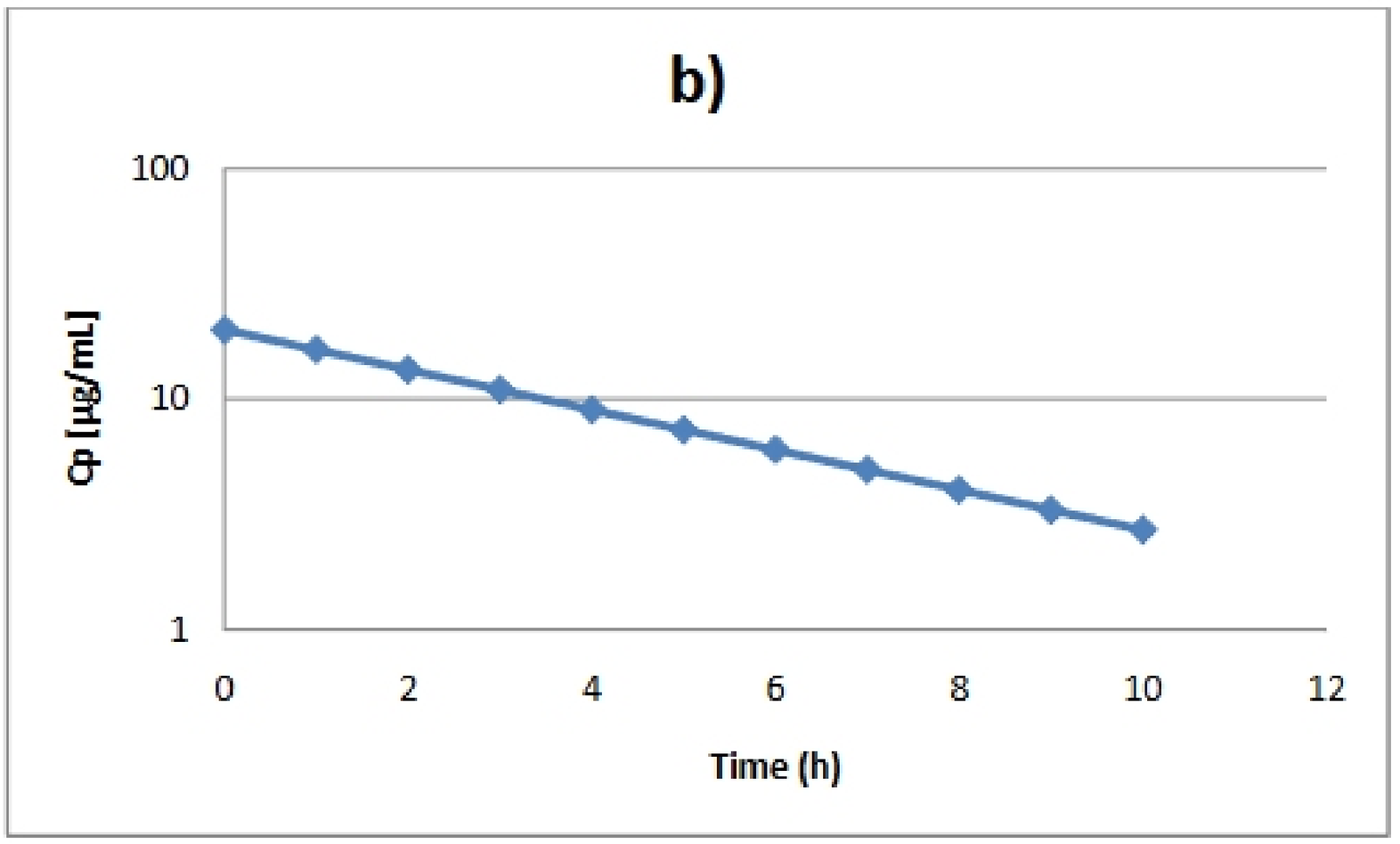
PHA 5127 Dose Optimization I

Case Study I

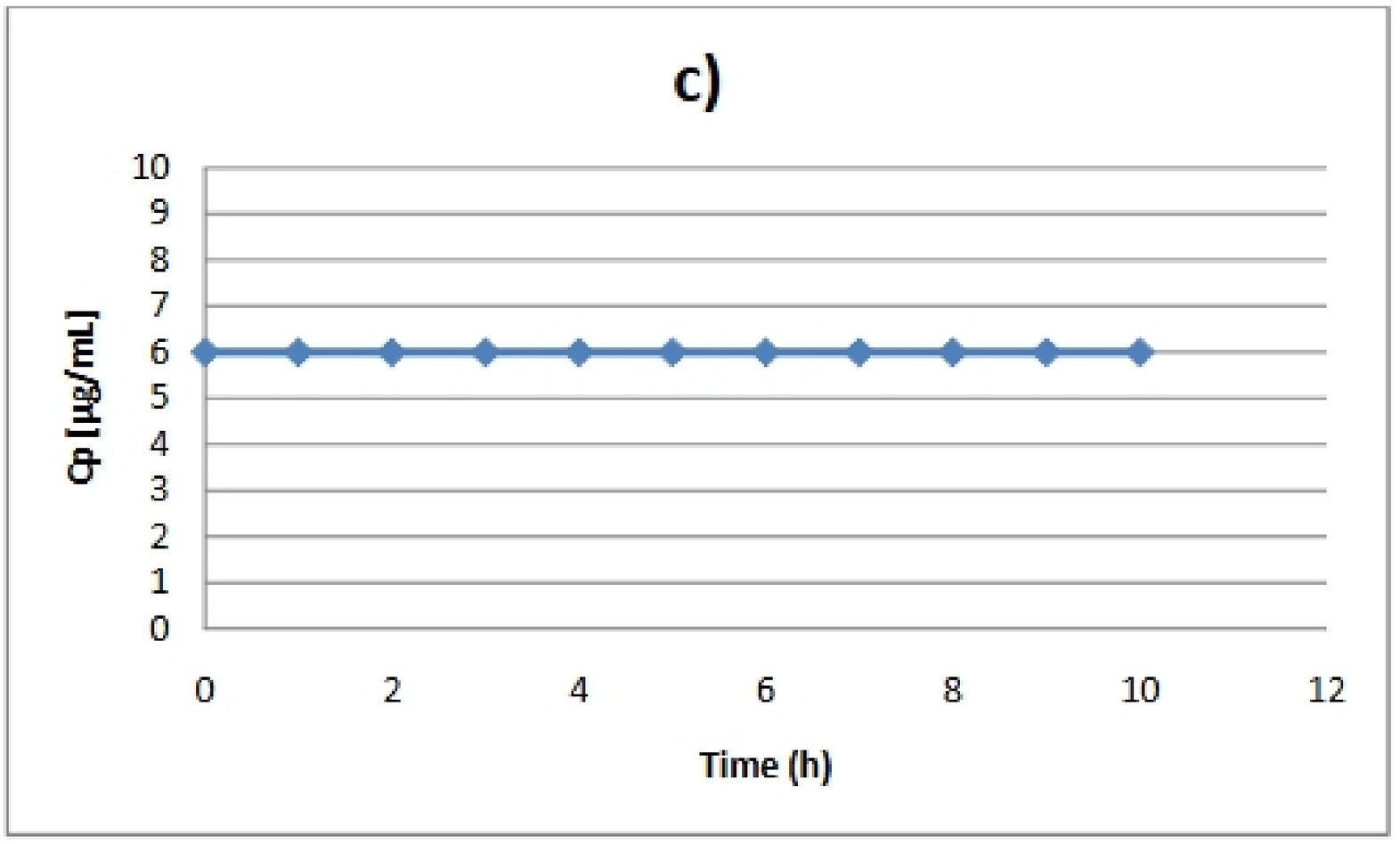
1. **Determine whether the elimination process in the graphs a-d is zero-order or first order. (Cp: Drug concentration in plasma)**



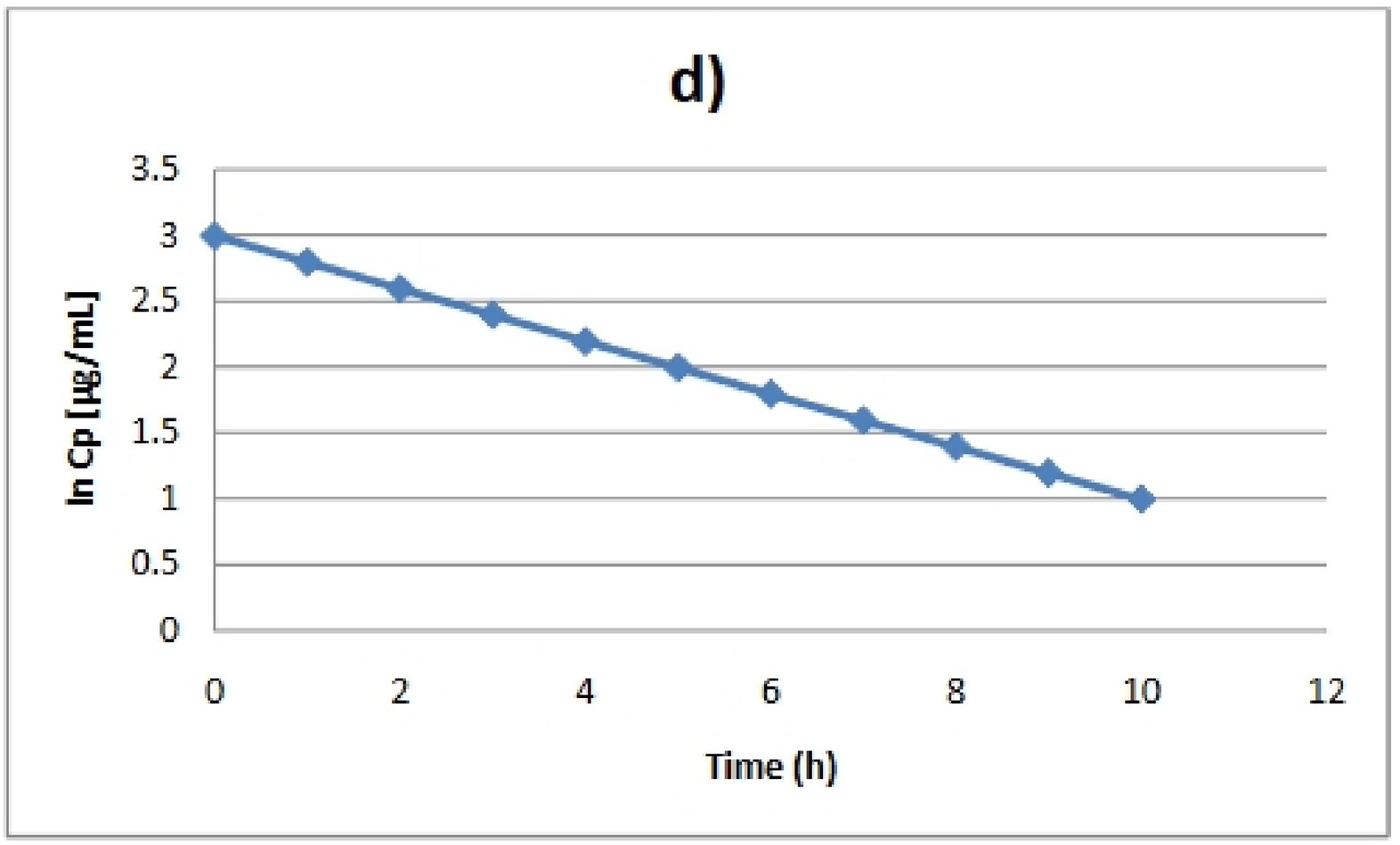
Zero-order (straight line)



First-order (straight line after semilogarithmic transformation of the y-axis)



No Elimination

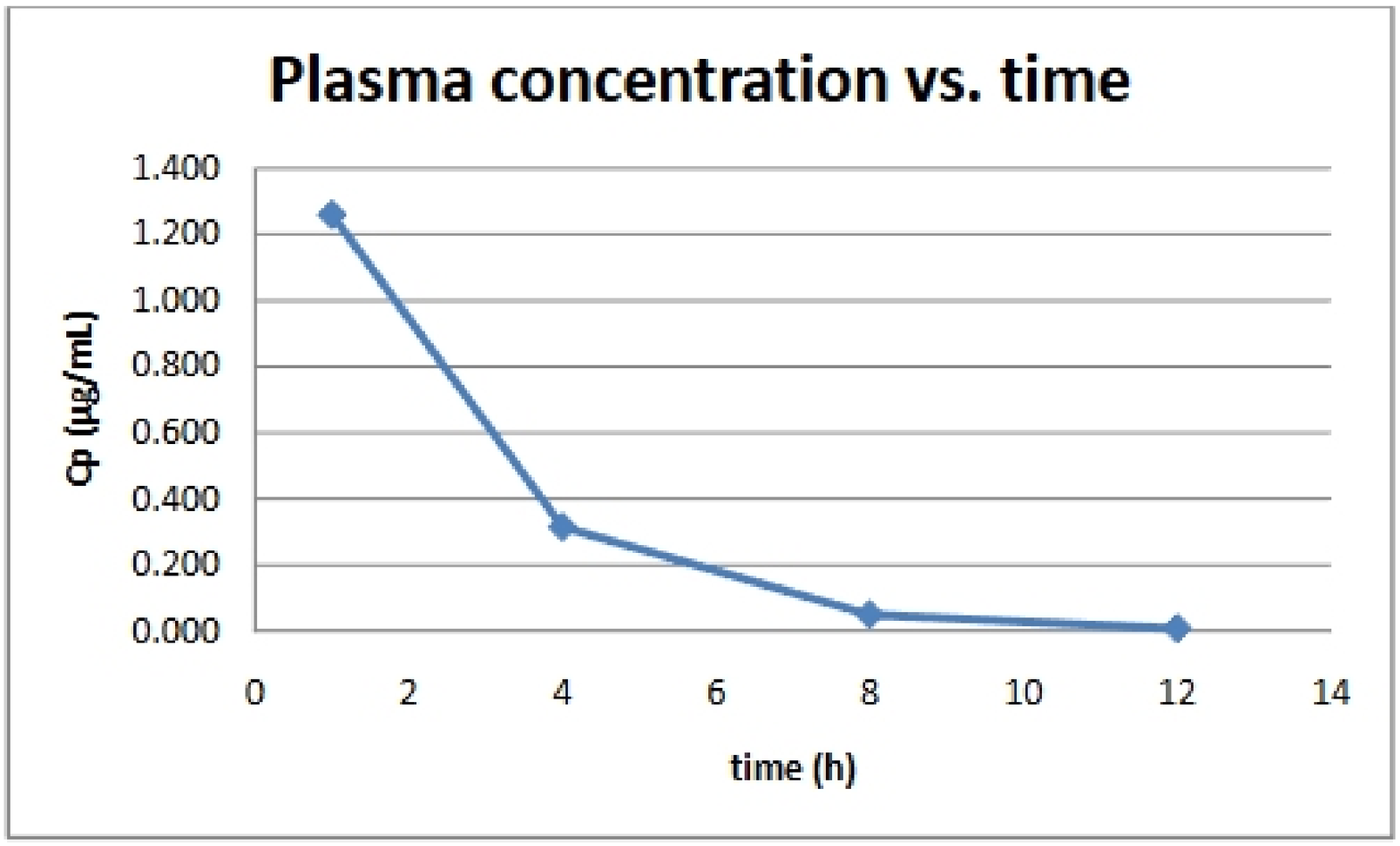


First-order (straight line after semilogarithmic transformation of the plasma concentrations)

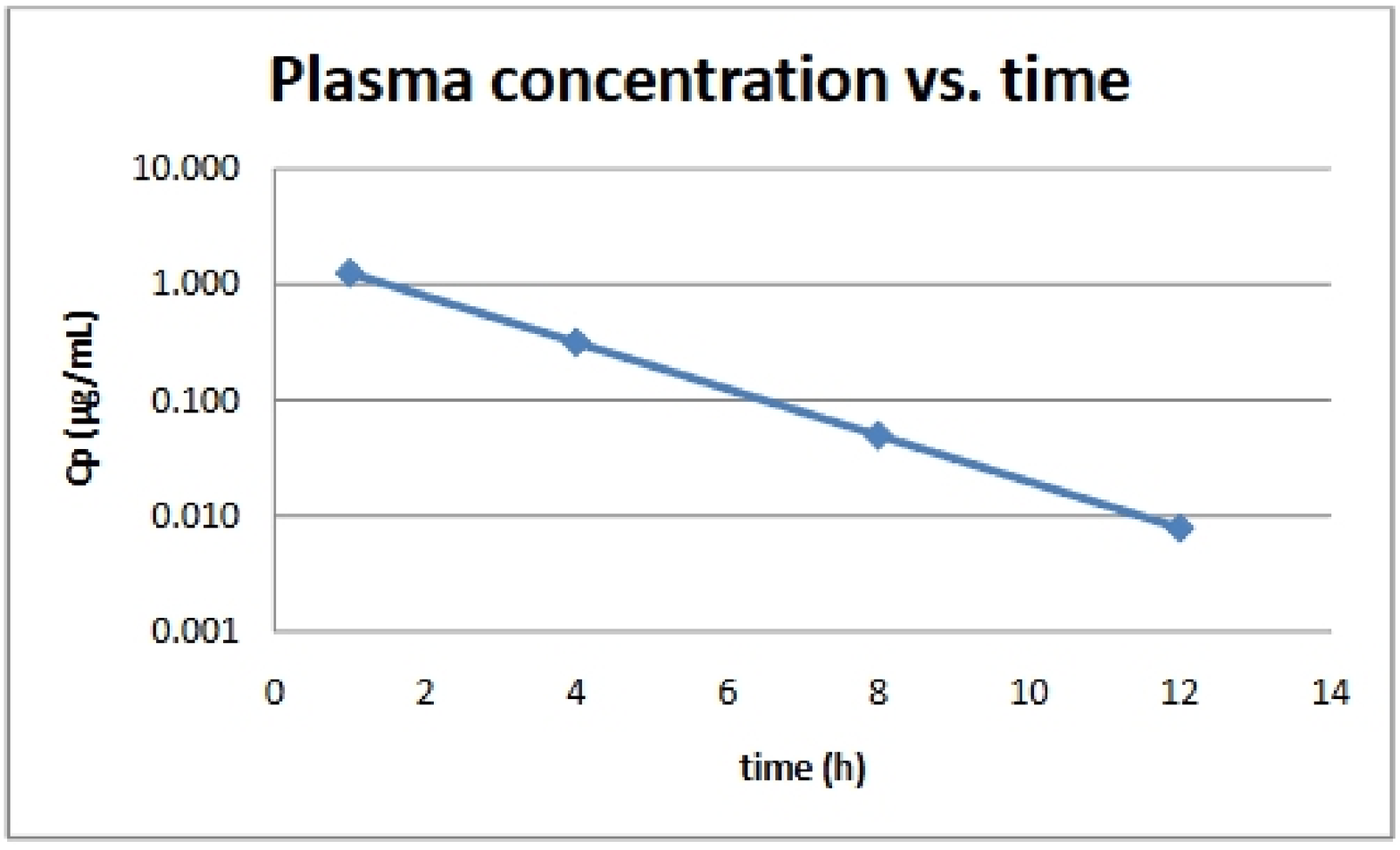
2. **200 mg Drug A was administered to a female patient (60 kg) through IV bolus injection. The following plasma concentrations (Cp) were observed.**

time (h)	Cp (µg/mL)
1	1.260
4	0.315
8	0.050
12	0.008

a) Plot Cp vs. time and determine the order of the elimination process



Semilogarithmic transformation of the y-axis



Plasma concentration vs. time profile is a straight line after semilogarithmic transformation. Thus, the elimination process is a first-order process.

b) Determine k_e and $t_{1/2}$ (half life)

time (h)	Cp (µg/mL)	ln Cp ( )
0	2.000	0.6931
1	1.260	0.2310
4	0.315	-1.1552
8	0.050	-3.0036
12	0.008	-4.8520

$$Slope = \frac{-1.1552 - 0.2310}{4 - 1\ h} = -0.4621\ \frac{1}{h}$$