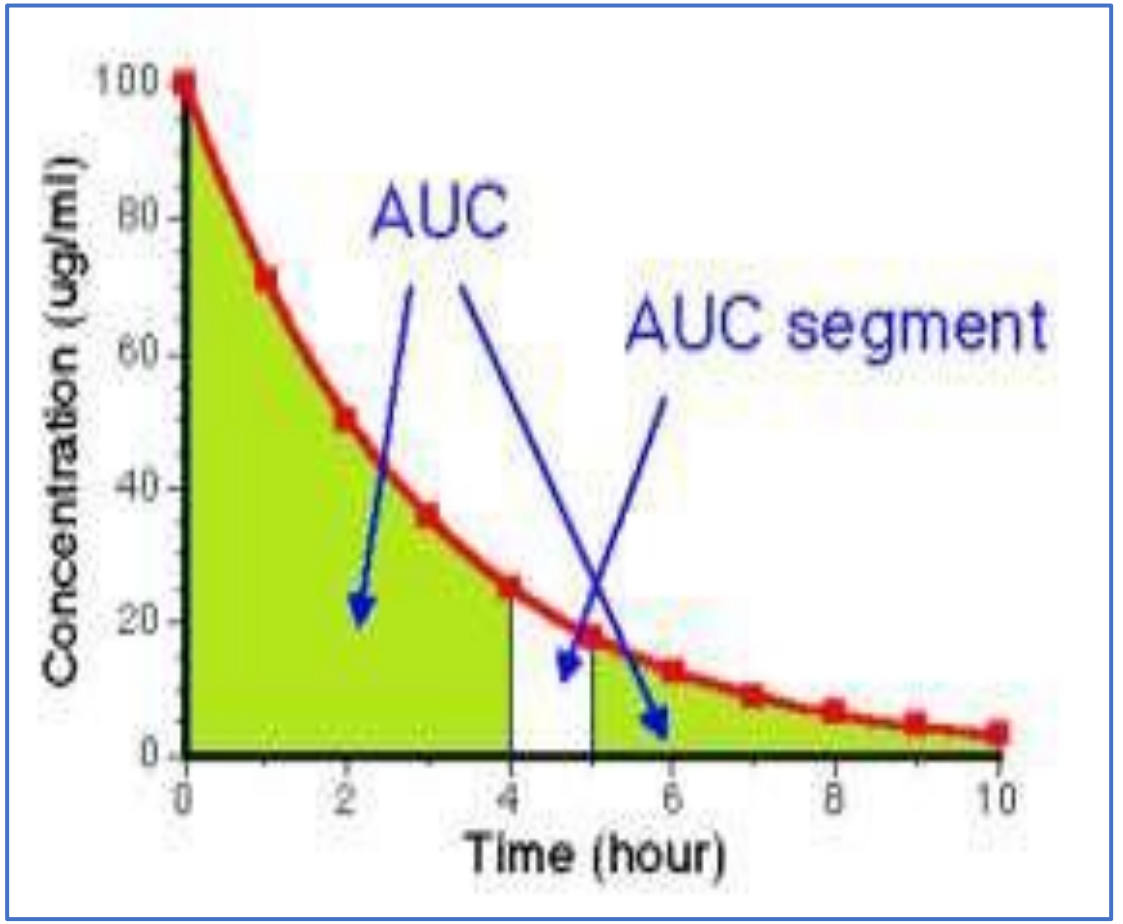
Lab.2

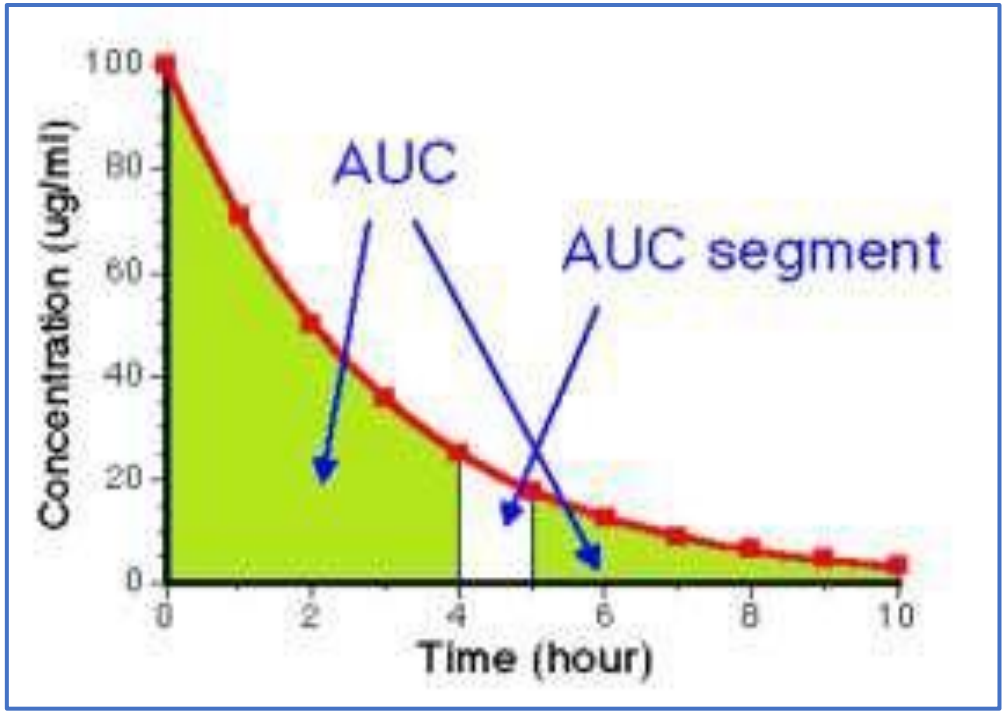
AUC CALCULATION- ORAL

What is AUC?

- **Area under the conc. curve** (AUC) is **a measure of the total systemic exposure** of a drug
- AUC can be **calculated from concentration-time data**
- It is **primary pharmacokinetic parameter** as it is can be obtained only from **plasma data.**



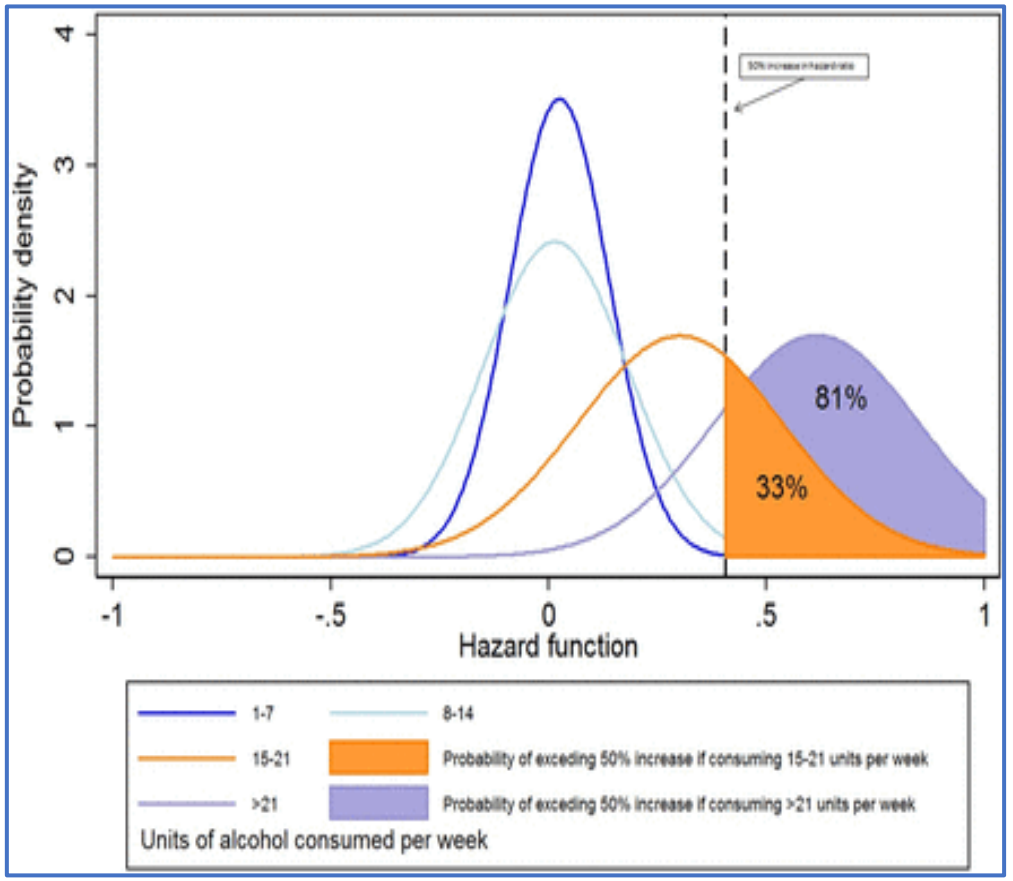
Area Under Plasma Concentration-Time Curve :



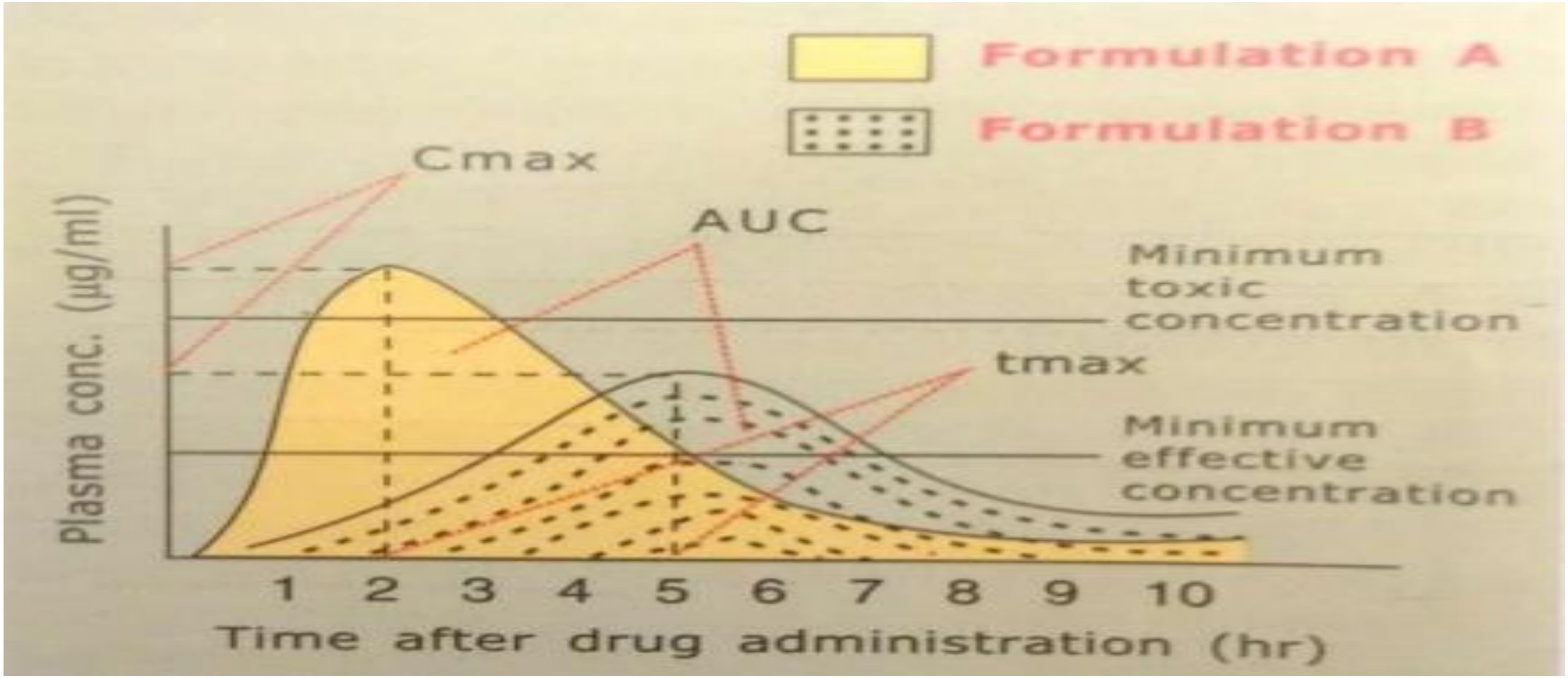
Linear Plot of Cp versus Time showing AUC and AUC segment

IMPORTANCE of AUC

- **Toxicology** : Measure of drug exposure
- **Biopharmaceutics** : Comparison of drug products in BA/BE studies
- **Pharmacokinetics** : Measure of Pharmacokinetic parameters e.g. Clearance, BA.



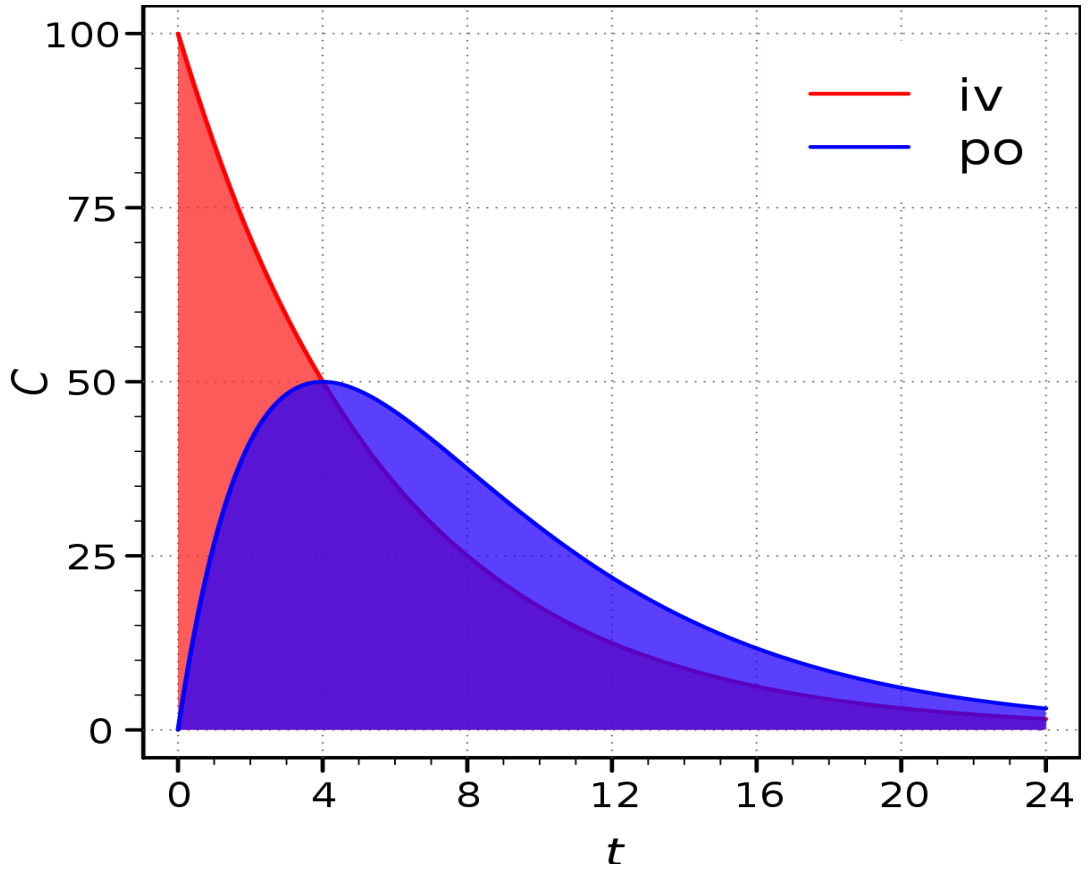
IMPORTANCE of AUC



Calculation of AUC

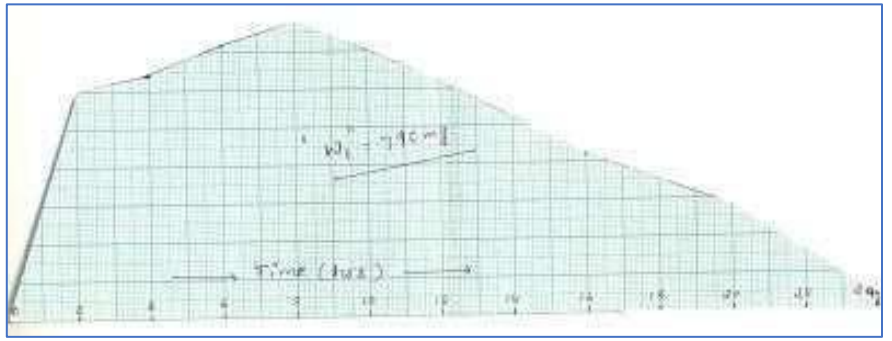
AUC CALCULATION METHODS

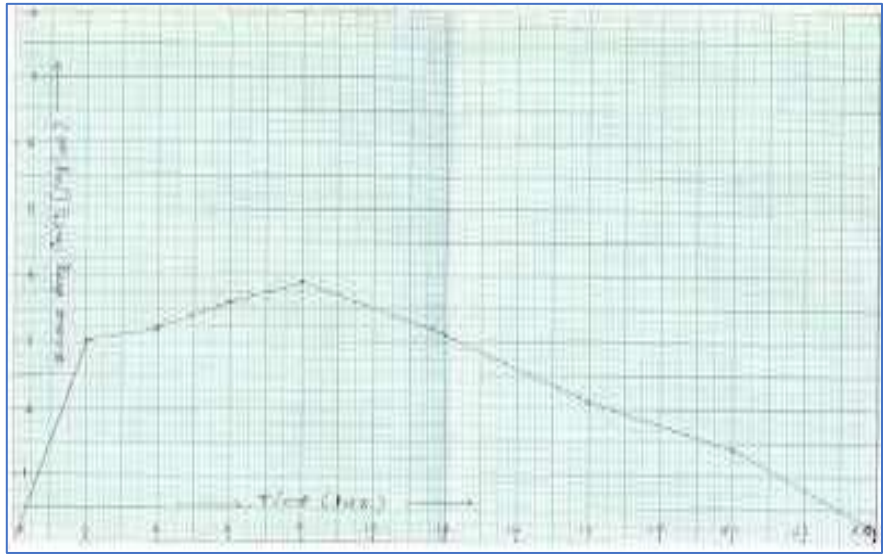
- Cut & Weigh method
- Mathematical :- Trapezoidal rule
- Planimeter
- Counting Squares method



Cut And Weigh Method

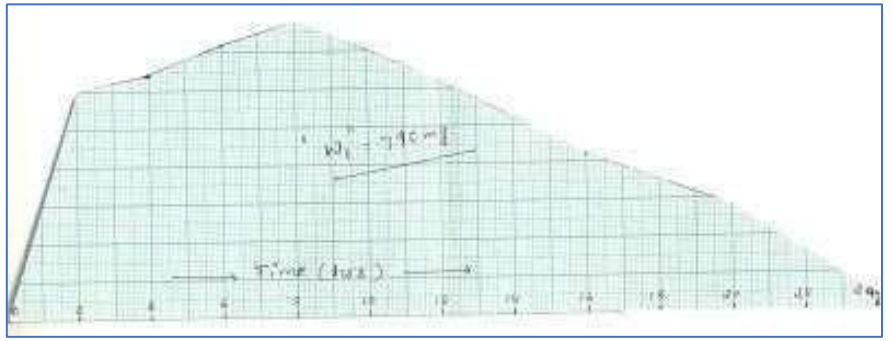
- **Plot** the plasma profile vs time on graph paper
- **Cut** the curve drawn carefully
- Require an **analytical balance**
- The weight of this cut portion is **W1**
- Weight of whole graph paper is **W2**
- Area of whole paper = **AUC2**

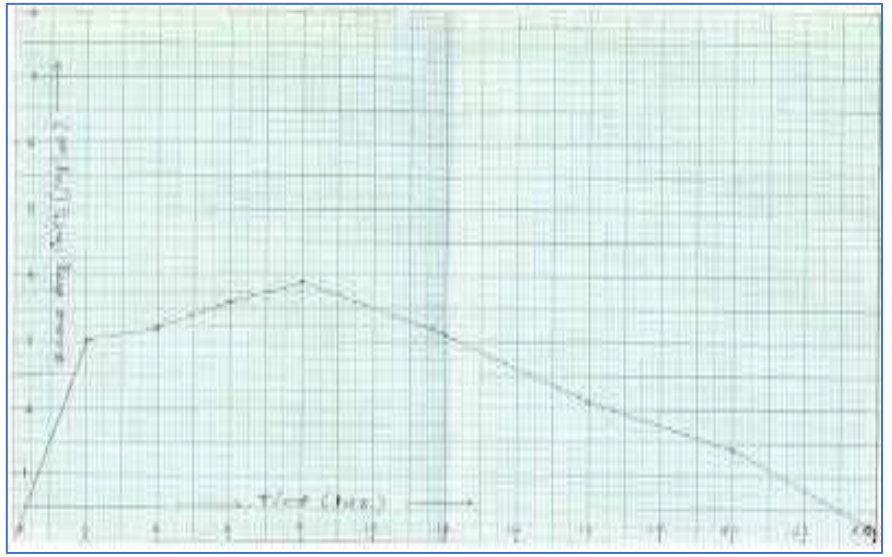




Cut And Weigh Method

- **Area= length X width**
- **AUC1/W1 = AUC2/W2**
- **For example if:**
- ✓ **AUC2=** 200 mg.hr/ml
- ✓ W1= 800mg
- ✓ W2= 3000 mg
- **Then:**
- ✓ **AUC1=** [(200)(800) / 3000] = 53.33mg.hr/ml
- Units Y axis mg/ml and X axis is Hours so area is mg.Hr/ml





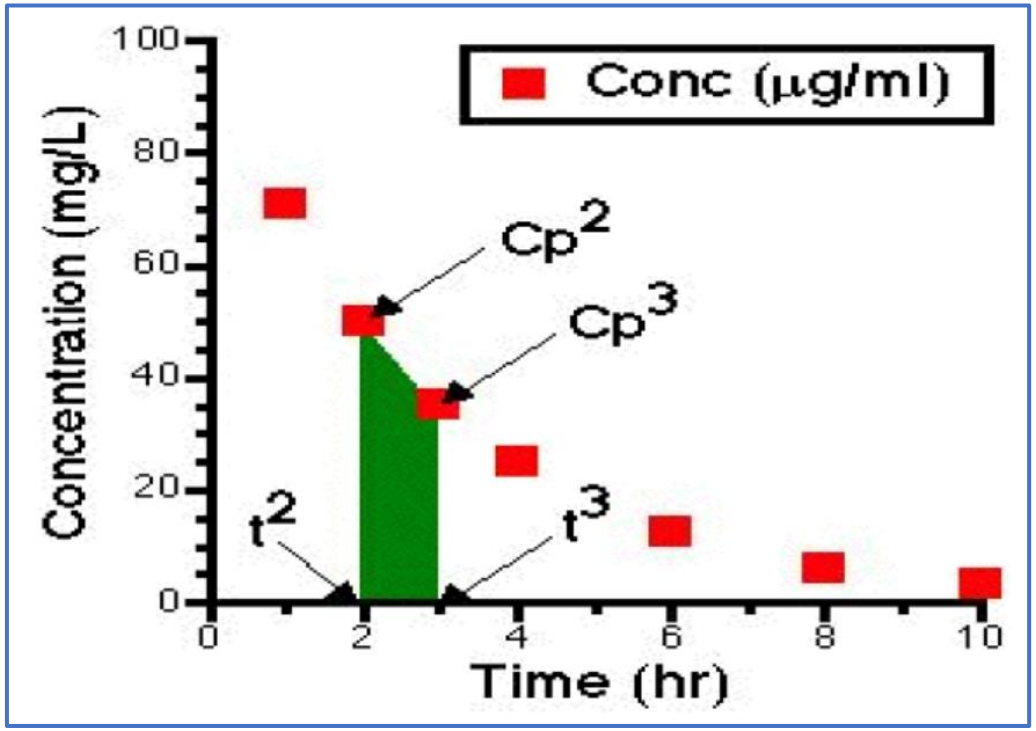
Trapezoidal rule

Trapezoid

Is four sided figure with two parallel sides

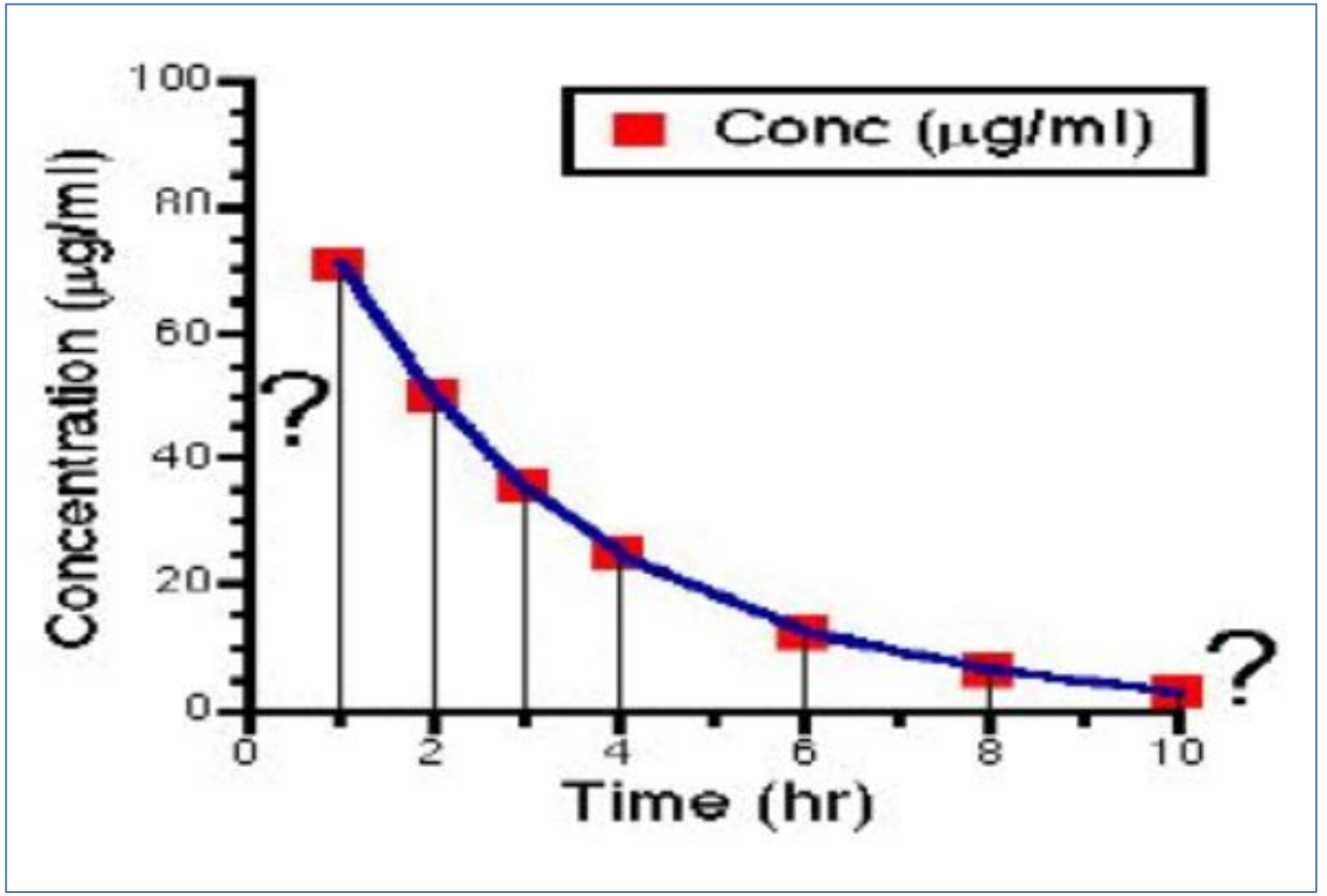
Steps

- ✓ Dividing whole AUC into trapezoidal segments
- ✓ Counting the area of each segments separately
- ✓ Summation of all the area to get the Total area



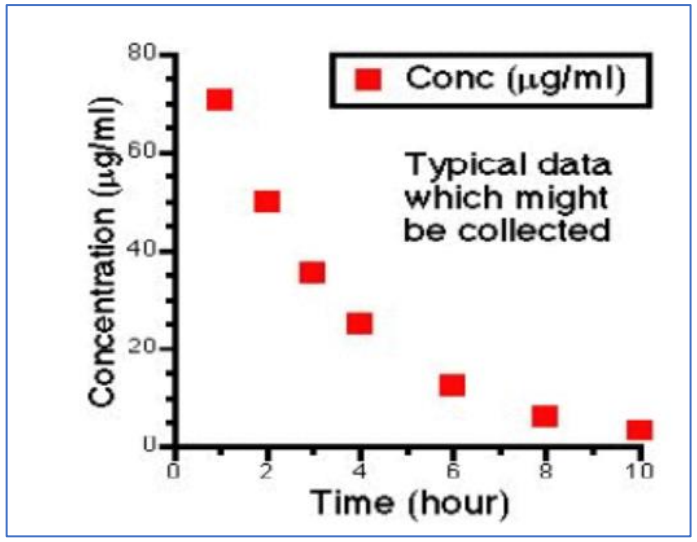
Types of AUC

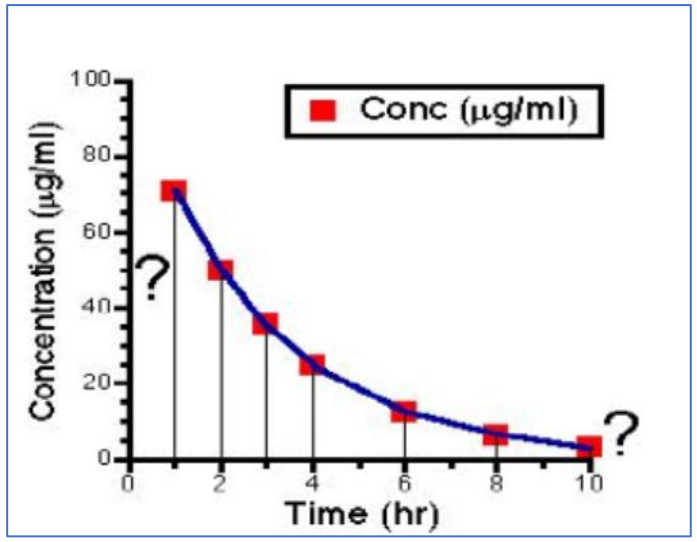
- AUC 1
- AUC t
- AUC last
- AUC ∞

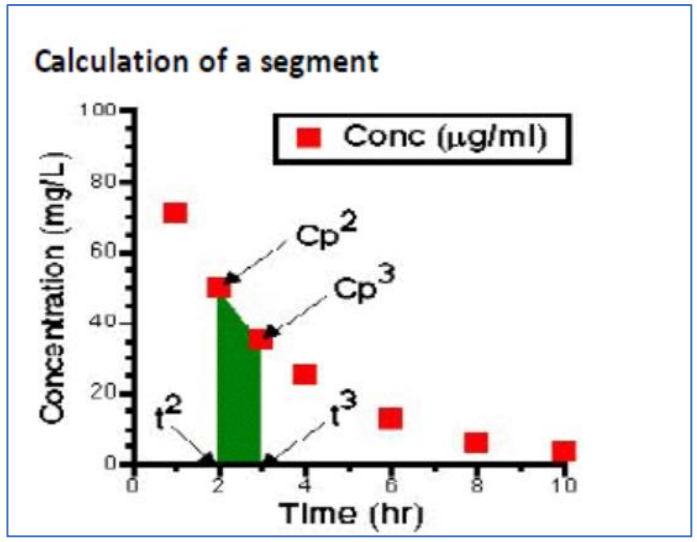


Trapezoidal rule

- **We can calculate the AUC of each segment if we consider the segments to be trapezoids**







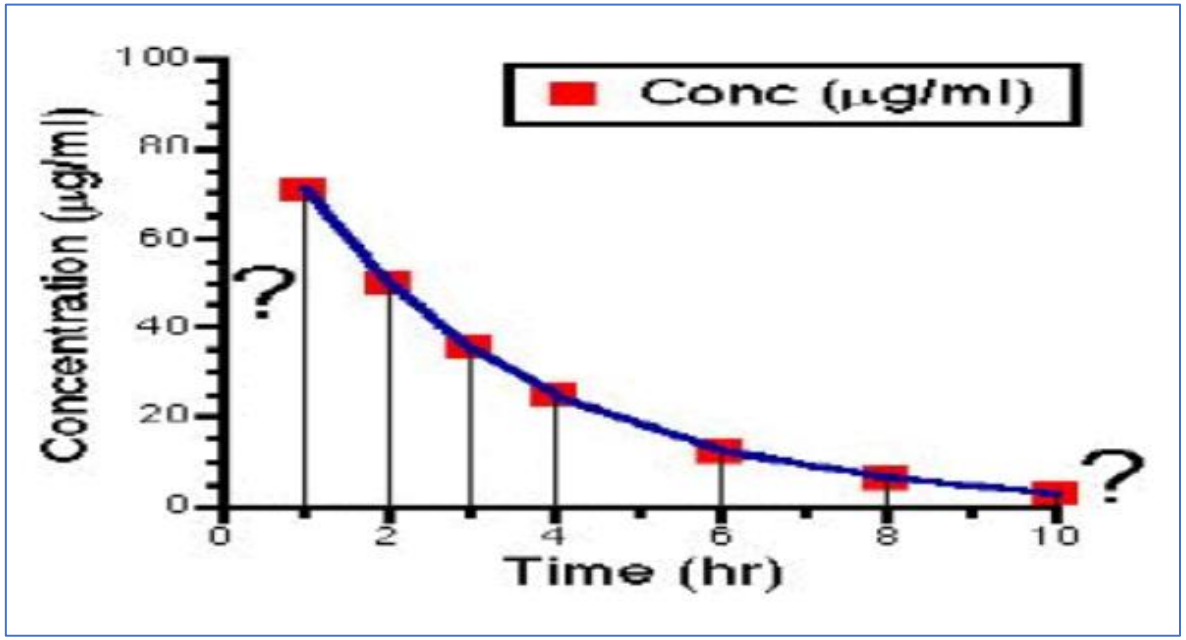
$$AUC_{2\text{-}3} = \frac{Cp2 + Cp3}{2} \times (t3 - t2)$$

Calculation of first & last Segment

- **The first segment** can be calculated after determining the zero plasma concentration Cp0 by extrapolation, while **Final segment** can be calculated from t last to t infinity.

$$AUC_{0-1} = \frac{Cp_0 + Cp_1}{2} \times t_1$$

$$AUC_{t_{last}-\infty} = \int_{t=t_{last}}^{t=\infty} Cp \bullet dt = \frac{Cp_{last}}{kel}$$



Total AUC

Total AUC

$$AUC_{0-\infty} = AUC_{0-1} + AUC_{1-last} + AUC_{last-\infty}$$

$$= \frac{Cp_0 + Cp_1}{2} \bullet t_1 + \frac{Cp_1 + Cp_2}{2} \bullet (t_2 - t_1)$$

$$+ \frac{Cp_2 + Cp_3}{2} \bullet (t_3 - t_2) + \ldots + \frac{Cp_{last}}{kel}$$


THANK YOU!