PHA 5127 Homework 1 solution:

1. (50)
   a. $k_e=-(\ln C_2-\ln C_1)/(t_2-t_1)=-(\ln 0.01-\ln 0.0736)/(3-1)=1$ hr-1
      $t_{1/2}=0.693/k_e=0.693$ hr
   b. Since $C=C_0e^{-ket}$, $C_0=C/e^{-ket}=0.0736/e^{-1*1}=0.2$ mg/L
      (Take 1 hr data point here. Any point is fine).
   c. $V=\text{Dose}/C_0=30/0.2=150$ L
   d. At t=4 hr, $C=C_0e^{-4ke}=0.2*e^{-4}=0.00366$ mg/L.
      Hence, the amount at 4 hr $A=C*V=0.00366*150=0.549$ mg.
   e.

Time interval	AUC
0-0.5	0.0803
0.5-1	0.0487
1-2	0.0503
2-3	0.0185
3-∞	0.010
0-∞	**0.208**

2. (10)
   It is a zero-order process and there is no half-life. Equal AMOUNT of drug is eliminated at equal time interval. At different times, half-lives will be different.

3. (20)
   a. $V_p(\leftrightarrow)+V_t(\leftrightarrow)\dfrac{F_u(\uparrow)}{F_{u,T}(\leftrightarrow)}=V(\uparrow)$

   b. $V_p(\leftrightarrow)+V_t(\leftrightarrow)\dfrac{F_u(\leftrightarrow)}{F_{u,T}(\downarrow)}=V(\uparrow)$

   c. $V_p(\leftrightarrow)+V_t(\leftrightarrow)\dfrac{F_u(\uparrow)}{F_{u,T}(\uparrow)}=V(\leftrightarrow)$

   d. $V_p(\leftrightarrow)+V_t(\leftrightarrow)\dfrac{F_u(\uparrow)}{F_{u,T}(\downarrow)}=V(\uparrow)$

4. (20)
   X is permeability limited and Y is perfusion limited. Under physiological condition, most of Y will exist in unionized form and the permeability is not a limiting factor for Y due to its high partition coefficient. Drug X is exactly the opposite.