EVE 290
Introduction to Environmental Engineering

Homework #5

1. One river (R_1) flows into a large, completely mixed lake, and two rivers (R_2, R_3) flow out. The rivers have volumetric flow rates and DDE (a metabolite of the pesticide DDT) concentrations as shown below:

   $Q_1 = 4.6\ m^3/s$ $Q_2 = 1.4\ m^3/s$ $Q_3 = ?$

   $C_1 = 7.1\ \mu g/m^3$ $C_2 = 2.1\ \mu g/m^3$ $C_3 = ?$

   (a) Determine Q_3 and C_3. Clearly state all assumptions.
   (Ans. $Q_3 = 3.2\ m^3/s$, $C_3 = 9.3\ \mu g/m^3$)

   (b) You probably assumed in part (a) that DDE is a conservative pollutant. Now, assume it is slowly consumed via biological/chemical reactions (reaction rate = $k\ sec^{-1}$) in the lake with volume = V. What do you think the "consumption rate" term looks like?
   (Ans: consumption rate = -kCV)