Homework #4

1. A river with 400 ppm of salts (a conservative substance) and an upstream flow of 25.0 m^3/s, receives an agricultural discharge of 5.0 m^3/s carrying 2000 mg/L of salts. The salts quickly become uniformly distributed in the river. A municipality just downstream withdraws water and mixes it with enough pure water (no salt) from another source to deliver water having no more than 500 ppm salts to its customers. Determine the mixture ratio of pure water to river water. (Ans.: F = 0.333, i.e., 1/3 pure water)

2. Two rivers (R_1, R_2) flow into a large, completely mixed lake, and two rivers (R_3, R_4) flow out. The rivers have volumetric flow rates and DDT concentrations as shown below:

$Q_1 = 3.6$ m^3/s	$Q_2 = 1.4$ m^3/s	$Q_3 = ?$	$Q_4 = 2.8$ m^3/s
$C_1 = 2.1$ $\mu g/m^3$	$C_2 = 0$ $\mu g/m^3$	$C_3 = 1.7$ $\mu g/m^3$	$C_4 = ?$

    Determine Q_3 and C_4. Clearly state all assumptions.
    (Ans: $Q_3 = 2.2$ m^3/s, $C_4 = 1.36$ $\mu g/m^3$)