**EVE 290**
**Introduction to Environmental Engineering**
**Fall 2010**
**Homework #13**

1. The dilution factor *D* for an unseeded mixture of waste and water is 33.333. The DO of the mixture is initially 9.0 mg/L, and after five days it has dropped to 3.0 mg/L. The reaction rate constant *k* has been found to be 0.22 $day^{-1}$.

    a. Determine $BOD_5$ **(ans: 200 mg/L)**.
    b. Determine the ultimate BOD, U **(ans: 300 mg/L)**.
    c. Determine the remaining oxygen demand after 5 days **(ans: 100 mg/L)**.

**2.** A wastewater sample has $k = 0.2\ day^{-1}$ and an ultimate BOD (U) of 200 mg/L. What is the final dissolved oxygen at five days in a BOD bottle in which the sample is diluted 20:1 and where the initial DO is 10.2 mg/L? **(ans: 3.9 mg/L)**

**3.** A standard BOD test is run using seeded dilution water. In one bottle, the waste sample is mixed with seeded dilution water giving a dilution of 60:1. The second bottle contains only seeded dilution water. Both bottles begin the test with DO at the saturation value of 9.2 mg/L. After five days, the bottle containing waste has DO equal to 2.5 mg/L, while the bottle with dilution water only has DO = 8.3 mg/L. Find $BOD_5$.

4. Some wastewater has a $BOD_5$ of 150 mg/L at 20° C. The reaction rate *k* at that temperature has been determined to be 0.23 $day^{-1}$.

    a. Determine the ultimate BOD, U.
    b. Determine k(T=15° C).
    c. Find $BOD_5$(T=15° C).