***Project 1: Pharmaceutical Applications***

Alzheimer's disease leads to nerve cell death and tissue loss throughout the brain. Over time, the brain shrinks dramatically, affecting nearly all its functions.

A pharmaceutical company is conducting a Phase I clinical trial to test the safety of compound XYZ9910 in humans. The drug, when given to mice, has shown to decrease brain tissue loss. Much to their surprise, mice treated with compound XYZ9910 also showed a decrease in body mass index (BMI) and an increase in alertness, compared with placebo (and non-treated animals).

Scientists at the company are considering to test this drug for both weight loss and to prevent Alzheimer’s disease. To be able to conduct the study, they need to find a state in the USA that has a large incidence of cases of Alzheimer’s as well as obesity. They also need to decide what the best dose of the drug to test is.

Characteristics of Compound XYZ9910, as found from a small pilot study

1. The drug is known to be substantially excreted by the kidneys. A blood concentration above 20 µg/dL can cause kidney failure.
2. Maintain a concentration of 4 µg/dL for at least 400 hours.

Data on cases is presented in an Excel file (on eCampus). The file also includes results from a small pilot study in which human volunteers were treated with three different doses (Dose 1, Dose 2, and Dose 3) of compound XYZ9910. In this pilot study, the concentration of the drug in blood was measured as a function of time and initial dose.

Your task is to help scientists decide

1. Plot Concentration vs. time of all three dosages in the same plot and decide the dose you want to use.
2. What’s the half life of the compound in blood of the dose you've chosen. For this project, define the half life of the compound as the time required for the maximum concentration of the drug to reach half of its maximum value in blood.
3. Decide the most economical rate of dosage. (How often do you suggest to take the pill?)

Note: You must use MatLab to solve this project.

**Deliverables:**

1. **Matlab Code (80%):** Deadline: 02/16/2012

Individually submitted code that performs required calculations and makes graphs. Submit a hardcopy of the editor, command, and figure window(s). The project must be individually done.

1. **Quiz (20%):**

A quiz(pass or fail) will be given.