

# MATH 142

## Group Project: Safe Drug Dosage

Due Friday, April 27 by 5pm

### Goals:

1. Gaining experience in group work.
2. Gaining experience in writing mathematically technical reports with precision.
3. Practice with series.

### Background:

A major pharmaceutical company (Pferck) is attempting to determine the maximum safe dose of its new drug, Flatulex. "Flatulence afflicts millions of Americans every day," according to Pferck's CEO, Gertrude Znerbis. "Our new drug can reduce their suffering and, equally importantly, the even greater suffering of their family members."

Researchers have obtained data on how long it takes for patients to metabolize (use up) Flatulex. They have determined that every hour, 7% of the drug gets metabolized (and the rest remains in the patient's system). They have also determined that the minimum therapeutic amount is 25mg (see below for further details).

**Your Mission:** Determine the maximum safe dose of Flatulex for twice-daily use. Also determine the range of effective doses that are also safe.

**Specifics:** The drug will be taken twice daily. The patient must have at least 25mg in his or her system for the drug to be effective, but it is permissible for up to two days to pass before the therapeutic level is reached (but no more than that). However, **at no time** can a patient have more than 500mg in his or her system. (This leaves an acceptable margin of safety; 500 mg is non-toxic.)

You will need to address the following questions; other questions may occur to you as you proceed.

1. After the first dose is taken, how much is left just before the second dose is taken?
2. After two days, is the amount in the patient's system at a therapeutic level?
3. What is the "steady state" level of Flatulex in the patient's system? (This will actually be a range.)
4. What range of dosages will keep the amount of Flatulex in the patient's system within the acceptable range?

Note that **you** are determining what the dosages will be. Dosages should be reported in whole numbers of milligrams.

### Assignment notes:

Submit a report with your analysis and conclusions to Pferck by the due date. Your report can be delivered to my office; I will personally deliver it to Gertrude Znerbis.

Your project must be typed, although any graphs and calculations may be done **neatly** by hand. The final report must be in the form of an essay that is easy to read and that explains all statements in a clear and unambiguous manner. It must not be of the form "question... answer, question... answer," etc. For repetitive calculations, present two or three of each type of calculation in the report to indicate the manner in which they were made. Please make sure that the reader is able to tell exactly where every single number came from. The reader should be able to use

your report to tell how to re-calculate every number, in order to check your figures. Assume that the reader is another Calculus II student not working on this project. Remember to integrate the presentation of calculations and conclusions - that is, putting all the calculations at the end in an appendix is not acceptable.

A preliminary report is due at the beginning of class, Friday, April 20. The preliminary report will be a fairly formal report that addresses several of the project questions and outlines how your group will approach the remaining questions.

Your final project report is due at 5 p.m. Friday, April 27 at my office in Ford 213.