Math 105—Calculus I   Project 1
a matter of alertness. . .

You are recently hired members of a successful independent mathematical and scientific technical contracting company, and have just been assigned your first contract. The letter you received from Medres, Inc., a medical research company said to have been recently acquired by the world-wide MPC, Inc. conglomerate (the recently expanded headquarters of which are to be found in the thriving metropolis of Lonlinc, Skanebra), follows.

◦ ◦ ◦ **Medres, Inc.** ◦

Office 728 Ratherold Hall
325 Eep Street
Lonlinc, SK
04685

29 January, 1996

Independent Mathematical Contractors, Inc.
Suite 2, Strawmarket Business Plaza
Lonlinc, SK 04685

Dear IMC:

Medres, Inc., always at the cutting edge of medical research, is planning the announcement of a major breakthrough by its pharmaceutical development division on the 14th of February. We have completed the manufacture and testing of a time-release capsule which will consistently and safely release the proven stimulent *enieffac* into the taker's bloodstream over an eight-hour period, to produce alertness and combat the effects of missed sleep.

Experimentally, we have observed that after taking one of our capsules, the amount of *enieffac* in the bloodstream is given by the following data:

$t =$	0 hr	.1 hr	.5 hr	1 hr	2 hr	5 hr	8 hr	8.5 hr	9 hr
$c(t) =$	2.01 mg	1.58 mg	1.06 mg	1 mg	1 mg	1 mg	1 mg	.02 mg	.01 mg

In order to report completely on the drug, we need a function to model this concentration data. We have therefore contracted with your company to develop such a model. In addition, we also need to know, based on the function you find, how long it takes for the initial spike in *enieffac* concentration to decrease to within .1 mg of its long-term value.

As our product announcement is scheduled for the 14th of February, it is of utmost importance that we have your finished project report by the 12th of that month. If you have questions as you are working on the project, you should confer with our chief consultant, Dr. Gavin LaRose, who has been instructed to assist you insofar as may be possible (as he is currently under contract with the well-known chemical reprocessing company Chemproc, Inc., he is unfortunately unable to work full-time on this project—thus requiring our use of your company). Please also note that it is written into your contract that all members of your investigative team who are working on the project contact him by the 5th of February to apprise him of your progress on the project. *Failure to do so will result in a significant payment penalty.* As is usual, we have enclosed a copy of our technical report specifications, which should govern the presentation of your results.

Yours sincerely,

Cever Etkoop, M.D.
President, Medres, Inc.

Encl: Technical report requirements

Technical Report Requirements

All reports submitted to Medres, Inc. should be written so that all members of the board of directors can understand the issues raised therein and therefore be able to appropriately use the report. The board members are all experts in various medical fields, but unfortunately (though they all wish they had taken more) may only be expected to have a background in precalculus mathematics.

Reports should further:

- Be written in the first person plural (e.g., "We found the requisite data from the map…").
- Include mathematical formulas in the the text of the body of the report as appropriate to describe the methods and results obtained. (While the report must be typewritten, it is fine to neatly hand-write formulas if that significantly simplifies its generation.)
- Clearly explain how the mathematical formulas that are included bear on the problem being solved.
- Consist of
  - An *Introduction*, describing the problem to be solved, and an indication of the mathematical method used to solve it.
  - A *Body*, describing the mathematical problem that was solved to answer the question(s) posed in the introduction, and the solution to it.
  - A *Conclusion*, summarizing the results obtained from the solution described in the body and clearly stating their relevance to the original problem as described in the introduction.
- Be $2\frac{1}{2}$–5 pages in length.