Math 141 Honors Project #3
Due Thursday, 12/6/07
Information Sheet

In this project, you will act as mathematical consultants to a fictitious company. Your goal is to solve the simulated problem described in the attached letter. Your work will be evaluated on the correctness of the mathematics, the clarity of the writing, and the overall presentation.

You should hand in a typed report of approximately 3–5 pages. This is a guideline, not a requirement; it is acceptable to use more or less space if you think it is appropriate. **All reports are due at the beginning of class on Thursday, December 6.**

You will work together in groups of three or four students, assigned by Prof. Martin. You are responsible for contacting the other members of your group and deciding how to collaborate. All members of the group will receive the same grade on the project (out of 35 points).

You and your group are strongly encouraged to meet with Prof. Martin well in advance of the due date to discuss your progress. I will be happy to look at rough drafts and to provide advice on matters of both mathematical content and technical writing style. Please note that I will be out of town during the last week of classes (December 3–6), hence unable to meet in person, although I will have occasional access to my e-mail during that time. In addition, your group may wish to make an appointment with the staff at the KU Writing Center (785-864-2399; http://www.writing.ku.edu/).

The following checklist will be used to grade your assignment. Please use it as a guide while preparing your report.

Content (15 points)

Does the report:
    1. Solve the problem that was originally asked?
    2. Construct an accurate mathematical model of the problem?
    3. Apply correct and appropriate mathematical techniques to find a solution?
    4. Explain all symbols, terminology and notation used?

Clarity (15 points)

Does the report:
    5. Give a clear and well-organized explanation of how the model was constructed?
    6. Give a clear and well-organized explanation of how the answer was found?
    7. Give acknowledgement where it is due, including appropriate citations?

Presentation (5 points)

Does the report:
    8. Use correct spelling, grammar and punctuation?
    9. Label any figures, drawings or tables appropriately?
    10. Look neat?

Date: Tue, 13 Nov 2007 07:39:08 -0600
From: Oread Exploration Inc. <groundcontrol@mail.oreadexp.com>
To: Jeremy Martin <jmartin@math.ku.edu>
Subject: URGENT: Mathematics consultants needed to rescue airplane

The Baby J, a small airplane with a crew of four intrepid KU alumni (employees of ours engaged in a cartographic expedition), has made an emergency landing in a remote, uninhabited part of the Gobi Desert in southern Mongolia. Soon after passing over Ulaanbataar airspace at 7:00 AM (local time), the Baby J experienced engine trouble, causing its speed to drop. The crew was able to continue for a while, but at 8:30 AM the compass ceased to function, and at 9:15 AM the wings suddenly froze (due to the extremely high cruising altitude), rendering the plane unable to change course. Our last accurate measurement of the plane's position dates from this time as well. The engines continued to function, and the extraordinary weather conditions in the Gobi Desert caused the plane to coast for an unusually long time before managing to land at noon.

Our last communication from the crew of the Baby J informed us that they are unharmed and have taken shelter in the plane. Forrtunately, they have enough provisions (four-ounce cans of tomato juice and little bags of peanuts) to survive for several months. Unfortunately, we have lost contact with the plane and we have no idea where it is. This is where you come in. Ed Small and Blanche Wheelwright have told us about the alacrity and flair with which your students in Math 141 have solved their respective manufacturing problems. Accordingly, we hope that they'll be able to help us rescue the explorers.

The appended table contains all the data we have for the Baby J's position, altitude (in meters), compass heading, and ground speed (in kilometers per hour). Standard procedure dictates that the pilot provide these data every fifteen minutes; however, after the wings froze, these updates became much more infrequent and erratic. (We assume the pilot had other things to occupy her attention.) All the data we have is in the appended table. We are fully confident that your students will figure out where the plane landed, with sufficient accuracy that we will be able to locate it.

A rescue expedition will set off from Ulaanbaatar on Friday, December 7. (We'd like to leave earlier, but we anticipate substantial logistical problems, the details of which we'll spare you. Besides, they're Jayhawk alumni. They'll survive just fine.) Accordingly, please ensure that your consultants submit their calculations no later than Thursday, December 6 at 11:00 AM.

We would like to ask you, Prof. Martin, to serve as a resource for your students as they solve this problem. We are pleased to offer you the standard academic consultant rate of $0.14 per day (subject, of course, to applicable state, federal and Mongolian taxes).

We look forward to your assistance, as do, I'm sure, our stranded aviators.

Very truly yours,

Allen Oread
President
Oread Exploration Inc.

Time	Longitude	Latitude	Altitude	Heading	Ground speed
0700	106°50′43″	47°58′11″	0	SbW	584
0715	106°34′48″	46°36′53″	2572	SbW	499
0730	106°24′6″	45°27′59″	4403	SbW	401
0745	106°5′50″	44°38′17″	6208	SSW	314
0800	105°48′22″	44°2′25″	8355	SWbS	245
0815	105°22′4″	43°31′45″	10124	SWbW	179
0830	104°54′52″	43°13′59″	12695		180
0845	104°22′47″	43°17′34″	14730		183
0900	103°48′49″	43°23′30″	15823		215
0915	103°27′40″	43°51′4″	17139		289
0930			18267		341
0935			16046		312
0955			12534		228
1010			13111		244
1040			9766		293
1050			10814		210
1100			9532		145
1110			2791		86
1125			1048		43
1145			534		26