Math 135 – Preparation for Calculus - Fall ‘14 - Prof. Janeba
Project 1 – cost analysis of expedition outfitters

Goals:

- To practice modeling a real-world event that is not a routine homework exercise.
- To gain experience dealing with realistic “open-ended” problems for which there may not be a simple numerical answer.
- To practice communicating and explaining mathematical results clearly and professionally.
- To practice working in a team on a mathematical problem.

International Geologic Science (IGS), a non-profit scientific organization, sends a large number of research teams to Antarctica each year. Currently, IGS contracts with private outfitters to support these teams with survival equipment, transportation, pilots, guides, cooks, and similar support personnel. There are two outfitters that IGS contracts with: Antarctic Expeditions (AE) and International Outfitters Universal (IOU). Both have rates based on the length of the expedition and the number of people in the research team that must be supported.

- AE charges $10,000 per day plus $2000 per supported person, with a $3000 once-per-expedition paperwork charge for permit processing.
- IOU charges $9000 per day, $5000 per supported person. IOU has no paperwork charge.
- Both companies supply all needed expedition equipment and food; IGS supplies all needed research equipment.
- The two outfitters perform their jobs equally well, and IGS is happy to use either outfitter or a mix of both (one per expedition). Either outfitter could handle all IGS’s needs.
- The length of each expedition is rounded up to the nearest full day, and is based on the maximum number of supported researchers (i.e. no refunds if someone has to leave early or arrive late).
- Expeditions last from 3 to 90 days.
- IGC research teams’ sizes range from 1 to 12 persons.

You and your group have just been hired as cost analysis consultants for IGS. As your first assignment, you are asked to produce guidelines for IGS that tell which company IGS should hire to support each of their many expeditions, in order to minimize their support costs.

Your report will be evaluated for its clarity, completeness, and correctness. The solution may take many forms and needs to be explained in detail through the use of words, numbers, formulas, diagrams, and/or graphs. Clarity means that, among other things, the non-quantitatively-oriented manager of outfitting must be able to understand your report as well as he may desire. Completeness means that the very-quantitatively-oriented controller must not have any further questions about your methods, since the report explains them carefully in the first place. Completeness also means no obvious issues were overlooked. [For further evaluation information, see the project grading rubric.]
IGS’ management team was split on whether to hire consultants; they will need to be very satisfied with your work to hire you again, and of course your fledgling consulting team needs the business.

**A preliminary report is due at 3 p.m., Monday, October 6, at the IGS office of cost analysis, 216 Ford Hall.**

**Your full report is due at 4 p.m., Friday, October 10, at the IGS business office, 317 Ford Hall. Anything slipped under the door after the secretary leaves will be too late and will not be accepted.**

Both your preliminary and final reports will be carefully printed on plain white paper fastened with a staple. You will also submit an electronic version of your report to your instructor via email. Use Microsoft Word or other word processor. Equations will be typed, using for example the Equation Editor built into Word. Well-labeled graphs that help with your report’s clarity are encouraged; they may be (very carefully!) hand-drawn or produced by computer, e.g. by Microsoft Excel. On the front page, team member’s names will be clearly visible.

Both reports will be self-contained, i.e. the reader must not need prior knowledge or understanding of the problem to understand your reports.

The preliminary report will be a formal report that shows a substantial start on the project and outlines how your group will approach the remainder. It is assumed that this preliminary report will be the foundation of your completed paper.

In the final report, your calculations and conclusions will be explained in detail, as befits a professional report. Your audience for both reports includes both the IGS controller who understands mathematics and the IGS outfitting manager who is not so strong mathematically. No one in your audience is an expert in the particular problem you have solved. Explain accordingly. Your explanation and presentation are as important as the mathematics, but of course your mathematical analysis must be sound, complete, and correct. It should go without saying that your grammar, punctuation, and spelling will be flawless.

Group evaluation: Your group turns in one report and everyone in the group gets the same grade. To provide some accountability, however, every group member is required to submit to their instructor an informal group evaluation. Handwritten, typed, or email are OK. The evaluation should include (just!) a few sentences about how well the group worked together. The evaluation must include your estimate of the percentage of the project work that you feel each group member did (e.g. 33%/33%/33% or 40%/35%/35%, etc.). These percentages must add to 100%. These evaluations will be held in confidence, and used at the end of the semester, if necessary, to adjust final grades.

A word to the wise: This project counts for about 5% of your final grade. Please make sure that your report’s qualities of completeness, clarity, and correctness reflect your best abilities. Please carefully read all the instructions and resources provided.