

Calculus I Lab 4

An Introduction to Mathematical Writing

Introduction

In this lab you will practice mathematical writing for a non-technical audience. You will need to solve a problem, posed in a fictional letter, and explain your solution in the form of response letter. You will probably want to include equations, and perhaps data or graphs as well.

In this lab we will learn guidelines on mathematical writing, and we will practice using the typesetting capabilities of *Mathematica*.

Review the Writing Guidelines and the Writing Checklist

The guide gives good suggestions for writing mathematics especially for a nontechnical reader.

http://edisk.fandm.edu/annalisa.crannell/writing_in_math/guide.pdf

Review the criteria for evaluating mathematical writing.

Lab Assignment

1. Read the attached letter asking you for your help in solving a mathematical problem.
2. Solve the problem.
3. Write up a report with your solution. Follow the Guide to Writing Mathematics. Review your report in terms of the Checklist. Your report should be in the form of a letter that answers the question asked.
4. When you have finished this report, save it as a pdf file, as if you were going to print it off and send it. When you save the file, use the name Lab4_yourname.pdf.
5. Then save the file in your M-drive Classes folder.

Arbor Tree Farm

Ginkgo Lane
Arborvale, IN 46464

Calculus Student
Goshen College
Goshen, IN 46526

Monday, September 19, 2011

Dear Calculus Student:

I sincerely hope that you can help me. I've gotten myself in a bit of a mess and I need someone with a better mathematics background than I have to help me out.

I just started working for Arbor Tree Farm this summer. The company cultivates exotic trees to use in bird sanctuaries and zoos. There aren't that many tree farms with this specialty, so we are a small business with few competitors. I just graduated from college with a major in philosophy. I took some botany courses and I've always wanted to work with trees, so this job seemed perfect for me and I really want to keep it.

About a month ago I talked with a man, Fred Greengrove, who worked for a greenhouse company. He claimed that they had developed a new type of greenhouse that would provide better protection from insects and disease. From what he said, it sounded like a really good investment for our company. I signed a contract to purchase a greenhouse. Then, just two days after I signed the contract, I heard that Fred had been hired by a bird sanctuary and was going to New Hebrides. I haven't been able to get his forwarding address so I can no longer ask for his help. That's why I'm turning to you.

Here is the problem. Our company is small and we can commit \$4,225 to this project without going into debt. Also, since the greenhouse can only hold a limited number of trees, we need to make sure that we're spending no more than \$100 per tree, otherwise we would be operating at a loss. Fred did show me that this was possible, but, without him, I can't figure out how to do it.

Here are the figures that I have. First, to build the greenhouse, we need \$2,222 just in start-up costs. Then, for each tree in the greenhouse, we need \$5 for a proper planter. But, in addition, there are disinfecting costs for each tree so that disease and infection don't spread. The more trees there are, the easier it is to spread disease and infection. Thus, the cost for disinfecting a tree depends on the total number of trees that are in the greenhouse. The cost of disinfecting any one tree is \$1 for each tree in the greenhouse.

I did manage to work out an example. Suppose we plant 10 trees. Then we would spend \$2,222 for the greenhouse, \$50 for the 10 planters, and \$10 to disinfect each of the 10 trees (that means that it costs \$100 to disinfect the entire greenhouse). This comes out to a total cost of \$2,372. That is below our budget of \$4,225 (which is good). But unfortunately this comes out to over \$237 *per tree*, well over our per tree budget (and that is bad!). Then I tried figuring out what happens if we increase the number of trees, say to 100. In that case, I got the cost per tree to be better, but still not acceptable; it came out to \$127 per tree. However, the total cost of the project came out to be an exorbitant \$12,722! I'm pretty sure that I did the calculations correct, but you can check me on that.

When my boss found out the results of my calculations, she threw a fit! She told me that she would fire me unless I can meet the total cost budget and the budget per tree. I have a weeks to find a way to make this work. I really need this job. I have lots of school loans to pay off.

Can you help me figure out what to do? I'm pretty sure that Fred Greensmith had worked out a perfectly good scheme, but I can't seem to figure it out on my own. Please help me.

Sincerely,

Rose E. Schrubb