Dear Math Genius,

I am writing to offer you an opportunity to be a part of an after school special I'm producing. In an attempt to encourage high school students to study science in college, the National Science Foundation has given us a grant to produce two shows which will feature college students who turn their lives around for the better because of a wonderful calculus course! The series will be called HOW CALCULUS SAVED MY LIFE, and we'd like you to help us with the script for one of our shows. We know that you are extremely busy, so we'll only burden you with helping us for one of our shows. Here's the information you'll need to help us out:

(Student's name) is a freshman at Rhenich College. One night his/her friends call him/her up to go out with them, but he/she decides to stay in his/her room and do his/her calculus homework instead (he's/she's really excited about practicing this new method of doing integrals that he/she learned in class that day – integration by parts). As it turns out, his/her friends were up to no good. They were caught at the local bar using fake id's and were arrested and consequently kicked out of school. We've got the whole bar scene figured out. What we need help with is the scene where (student's name) is in his/her room doing his/her calculus homework. We really want our audience to believe that calculus saved his/her life and so it is important that they see him/her doing a calculus problem. We want our audience to completely understand his/her thought process and to sense his/her enthusiasm when working on calculus homework. In particular, we want them to understand how great he/she feels when he/she realizes that he/she has done the problem correctly. So, we were hoping that you, since you're such a math genius, could help us write the script for this portion of our show. We need you to provide us with a dialogue (that will take place in (student's name)'s head) for solving this calculus problem:

The region between the graph of $y = \sqrt{x \sin(x)}$ and the x-axis from $x = 0$ to $x = \pi/2$ is revolved about the x-axis. Find the volume of the resulting solid.

Since some of the people in our audience won't know calculus, we will want you to explain as much as possible why he/she is taking the steps that he/she chooses to take when doing this problem. We're actually clueless on what "integration by parts" even means and are curious to hear your explanation of what it is and why it works. We'd also like to know how integration is related to finding volumes (we hear

volumes are all the rage with our audience – which is why we chose this problem).

I'm guessing at this point you have a couple of questions:

(1) What is this whole "he/she" business anyway?
  - Well that's where you come in again. We're also hoping you will supply us with the student's name and gender – feel free to use your own name and make student have whatever personality you want. We know you're the expert on math and math geniuses and we would like your input on what kind of character would be believable.
(2) Are you sure you trust me that much?
  - We've heard from several sources that you're not only a math genius, but you're a super person and we promise to carry out this scene however you write it.

We would like to begin filming this show as soon as possible and would appreciate it if you could get us your script by Wednesday, March 8, 2006. We hope that you'll want to be part of this exciting show that could encourage more people to study math in college.

Sincerely,

A. B. Densaren