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Math 104 Students
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Dear Calculus Students:

I've run into a problem with my lawn, and the local lawn care people couldn't help. My search for help eventually led me to your enterprising and resourceful professor, who assured me you are the people for the job.

Long story short, I recently managed to escape the clutches of what turned out to be a cult, and found myself a job as a secretary for this law firm. The place I'm renting has an adorable garden—I've already bought some lawn ornaments, I found the cutest unicorns! I'd like to keep it looking nice, but since I'm unable to go outside during the day (another long story), I really can't mow the lawn myself, and I certainly can't afford to pay someone to mow it for me. I was crushed—turns out being on your own brings hard problems. Then it hit me – astroturf! I was so proud of myself, solving my first home-care problem so well!

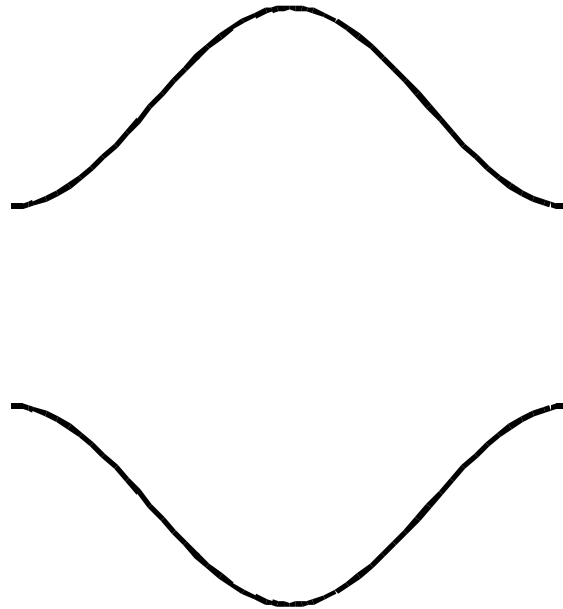
But when I started shopping around, I realized I still have a problem. Can you believe astroturf comes in rolls of 3 different widths! *Why* do they have to make life difficult by giving choices? But I told myself to get over it, and I started trying to figure out how much of each width I'd need, so I could comparison-shop. Boy, did that give me a head-ache! Part of what makes my garden so adorable is the curviness of the lawn, but that curviness does *not* make figuring out how much astroturf adorable. And that's why I'm turning to you.

The astroturf comes in rolls that are 4 feet wide, 3.5 feet wide, or 2 feet wide rolls. (You can get whatever length roll you want).

I need help figuring out what width of roll I should get, and how long a roll I should get. If I hadn't been giving all my hard-fought-for money to that darned cult for so long, I wouldn't have to worry about cost, but as it is ...For each width, I need to know how much astroturf I'll have to buy to completely cover the lawn. With the curvy shape of the lawn, I know the astroturf will have to be trimmed to fit; for each width, could you also tell me how much of what I buy, I'll just end up throwing away?

Where I rent, I pay by the bag for garbage removal, so it might be worth it to me to throw away less carpet, even if it means paying more for a narrower width. In fact, it might even be worth it to special order a custom-made width (you can special order anything from 1 inch wide to 5 feet wide). Could you tell me what width I'd have to special order to guarantee that I'd be throwing away less than 30 square feet? How about to guarantee I'd be throwing away less than 15 square feet?

Your professor suggested I include a sketch of the shape of the lawn, so I've done that. I've even included measurements!



I need to get the astroturf installed as soon as possible, so the existing lawn doesn't start to look like a meadow. Please answer my questions by October 10th.

Yours sincerely,
Harmony Kendall