CALCULATED FICTION

MATH PROJECT 6

November 2, 2004

We're not having math workshop this week, so this is a do-it-yourself deal. This project is due next Tuesday, November 9, at the beginning of the math workshop.

You do not need to turn in Math Project 5; that work should be submitted as part of your supplement to the final project proposal. If you haven't turned in Math Workshop 5 yet, please get it to Brian at your earliest convenience.

PART 1: THE $87 BILLION SUPPLEMENTAL

Work on your supplement, which is due on Friday. Enough said.

PART 2: YOU SAY TOMATO, I SAY TOMATHO*

You may work with at most 2 other people on this project. As always, you need to say who you worked with.

Chapter 3 of TLOM discusses, among other things, a method for approximating the area of a plane region. After cutting the region into strips, you approximate the area of each strip with a shape you can easily find the area of, like a rectangle or a trapezoid. Look at the diagrams in TLOM to see how it works.

In this project, we'll apply this idea in 3 dimensions. Your job is to use the method of cutting into "strips" to approximate the volume of a vegetable or piece of fruit. (In the 3-dimensional case, a strip is actually a *slice*.) Read all the way through these instructions before you start; you may want to do step 6 before step 1.

INGREDIENTS:
1 vegetable or fruit (at least as big as your fist or so)
1 sharpish knife
1 ruler
1 bag leftover Halloween candy

1. Cut your chosen object into slices. The slices don't all have to be the same width, but each slice should be of the same thickness all the way across. (No crooked slices.) Make your slices in a direction that will make the following steps as easy as possible.

2. Pick a particular slice. Find one or more simple shapes to use to approximate the area of the top of the slice. (For most fruits and vegetables, a circle will give a good approximation, but be creative.) Make the necessary measurements on the slice to calculate the desired area.

3. Now measure the thickness of the slice. The approximate volume of the slice is the area times the thickness. For example, if my slice is ½ cm thick and the top surface is approximately a circle with radius 5 cm, the approximate volume of the slice is (area of circle)*(thickness of slice) = $(\pi * (5\text{ cm})^2) * (\frac{1}{2}\text{ cm}) \approx 39.3\text{ cm}^3$.

4. Repeat steps 2 & 3 for each slice. Keep track of your results in a nice table. Include a row for each slice, and include columns for area, thickness, and volume. Fill in the table with the results of your measurements and computations. Also, make a sketch of each slice, and indicate on your sketches the shapes you used to approximate the areas.

5. Total up the approximate volumes of your slices at the bottom of the volume column. This is your estimate of the volume of your object!

6. Now think of two ways to measure the actual volume of your object. Do one of them. Be as accurate as you can.

7. Write up your results in a snappy report. Include all relevant information, such as what the object was and which direction you sliced it in. Discuss any interesting problems you faced or decisions you had to make and how you dealt with them. Compare your approximation to the volume with the volume you actually measured for your object. How close are they?

8. Unless it's too gross, eat the slices of your object. Wash it down with entire bag of leftover Halloween candy. Repeat as necessary.

** Many thanks to Noah Dassel for this gem.*