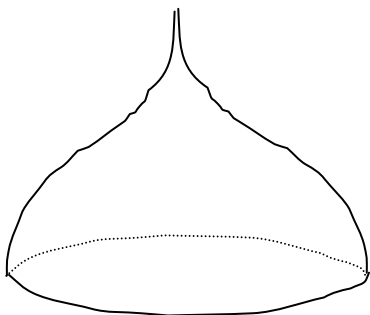
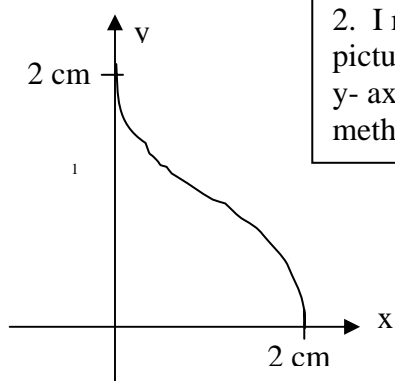


The Calculus of a Kiss



1. This is roughly the shape of a Hershey's Kiss. The first thing I did is to place part of a cross section on a graph grid and describe how to get this solid by revolving it around an axis. (See #2)



2. I measured my candy and decided I could take the cross section pictured on the left and rotate the region in the first quadrant about the y-axis and find the volume of the piece of candy by integration and the method of shells.

3. I then had to write the equation of the region's boundaries. (This is an estimate.) I estimated that the equation of the curve in the first quadrant was approximately:

$$f(x) = \begin{cases} (x-1)^2 + 1, & 0 \leq x \leq 1 \\ -(x-1)^2 + 1, & 1 < x \leq 2 \end{cases}$$

4. To graph $f(x)$ on a graphing calculator, let

$$y_1 = ((x-1)^2 + 1) / ((x \geq 0) * (x \leq 1))$$

$$y_2 = (-(x-1)^2 + 1) / ((x > 1) * (x \leq 2))$$

5. The region to be revolved about the y-axis is bounded by the curve $f(x)$, and the lines $x=0$ and $y=0$.

6. I found the volume of the candy by the method of shells:

$$V = \int_0^1 2\pi x ((x-1)^2 + 1) dx + \int_1^2 2\pi x (-(x-1)^2 + 1) dx$$

7. Let the graphing calculator give you the volume:

$$\text{fnInt}(2\pi x ((x-1)^2 + 1), x, 0, 1) = 3.66519$$

$$\text{fnInt}(2\pi x (-(x-1)^2 + 1), x, 1, 2) = 5.75959$$

$$\text{The actual volume} = 3.66519 + 5.75959 = 9.42478 \text{ cm}^3$$

Calculus Candy

Names of group members:

| | |
|-------|-------|
| _____ | _____ |
| _____ | _____ |

1. Sketch a picture and the name of the piece of candy your group will use.

2. On a piece of graph paper, draw the region in the first quadrant you wish to revolve about an axis. Be sure to measure the candy and scale your axes accordingly.

3. Write the equation(s) of the boundaries of the region and which axis you are revolving around.

4. State the method you are using to find the volume (disks, washers or shells).

5. Write the integral or integrals you would use to find the volume. Let the graphing calculator find the answer. Circle your final answer and be sure to include the correct units.

The Calculus Whiz Who Loved Candy