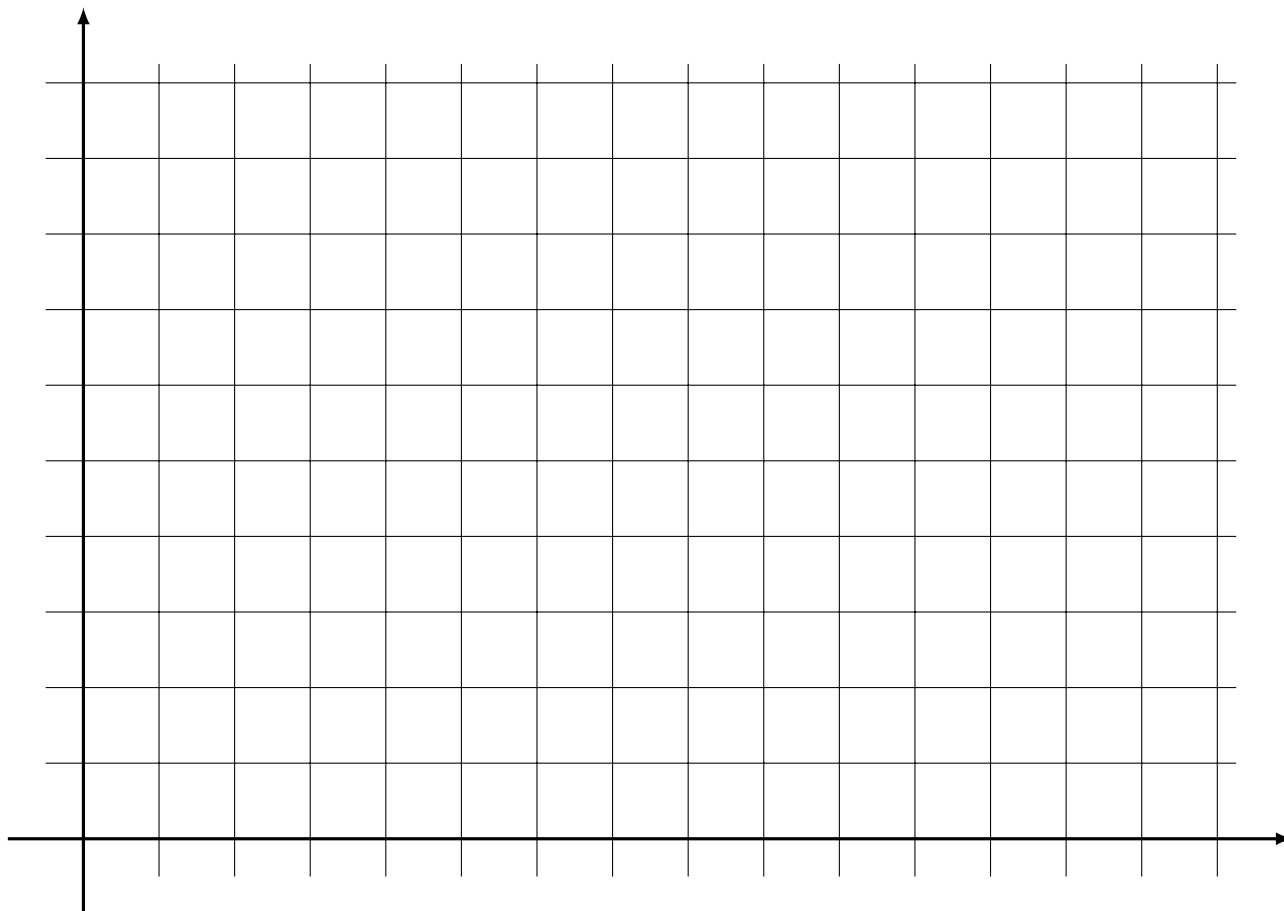


This project may be completed individually or in a group of two or three students. If you wish to complete the project as a group, let me know so that I can make the appropriate Blackboard tools available. You will submit the written report to Project #2 Assignment by uploading a pdf file. Please follow all the specifications for a written report project (including those for graphs) that are outlined in the Specifications document. You will need to include pictures or scans of hand-drawn graphs, but sure to make these fit as part of the report and adjust the scale of computer produced graphs to match.

**Read all the directions for each part before you begin.** There are steps to follow for each part and you should know where they are leading you to before you start working. You will write-up your findings and conclusions for both parts. Use the steps as a guide, but your report should not have numbered questions and answers.

### Part 1 - Cake!

- (1) Choose a slice of one of the cakes.
- (2) Trace your slice on the centimeter grid below. Think first, draw second. We want this to represent a region that when revolved around an axis gives the entire cake. What do you need to consider to determine where to place the slice of cake?



- (3) Find functions which give the shape of your slice when graphed. Consider lines, parabolas, circles, ellipses, trig functions, and any other types of curves you are comfortable with. You may need to consider piece-wise defined functions. Keep in mind that not all “bowl-like” shapes opening downward are necessarily parabolas.

- (4) How do you know your model function(s) is “close enough” to the real shape? Determine some coordinates on the graph you drew above. Do these fit the function?
- (5) Use the shell or washer method to estimate the volume of the entire cake. Depending on your functions one method maybe easier than the other. Feel free to use a calculator or computer to evaluate the integral(s).
- (6) I used a 12-cup pan to bake these cakes. How close do you think your estimate is to the volume of the actual cake? Do you think the pan was completely full?

## Part 2 - Playdough!

- (1) Choose the base of your sculpture as one of the following:

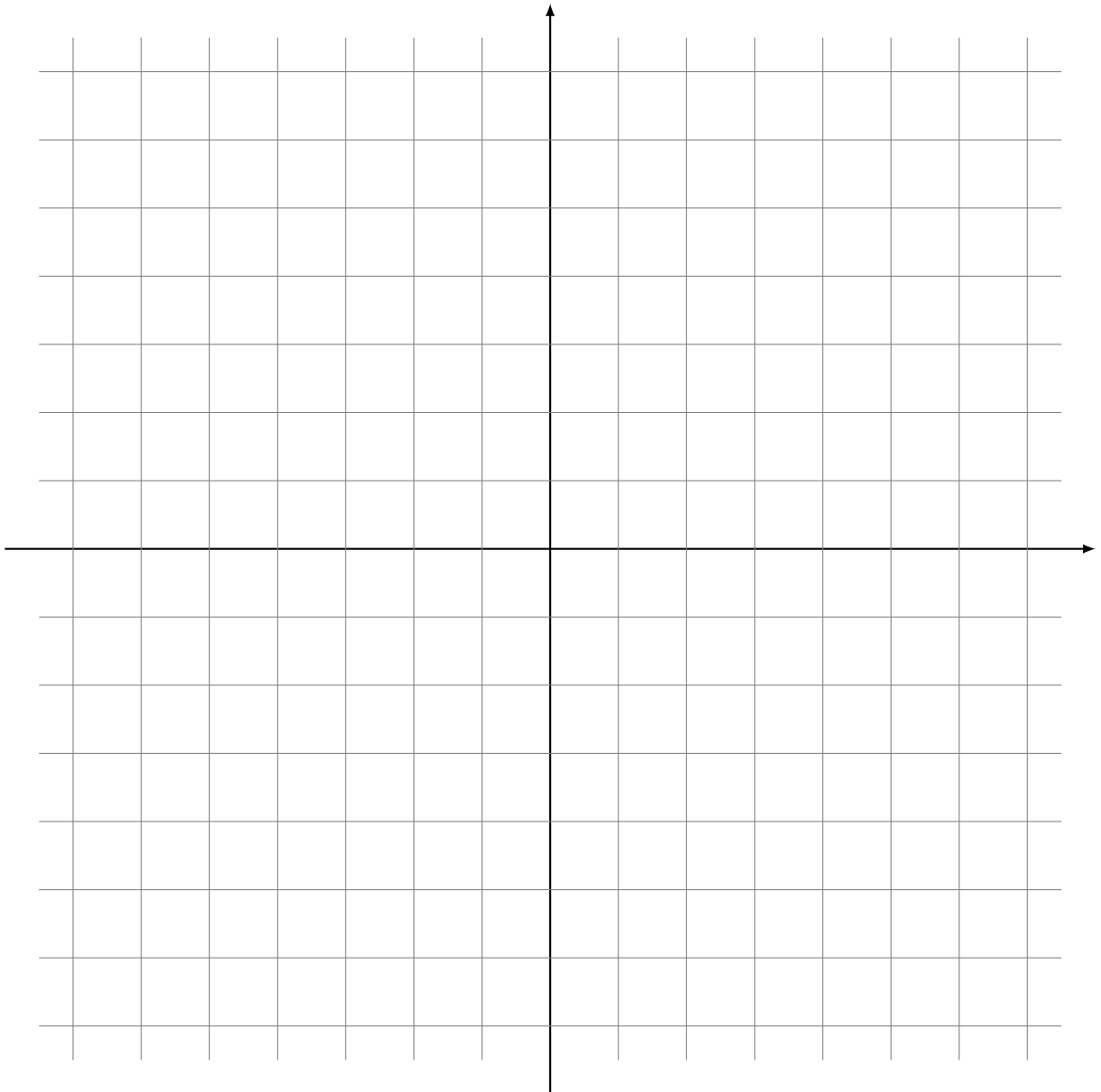
CIRCLE

TRIANGLE

RECTANGLE

SOMETHING ELSE

- (2) Draw a sketch this shape on the axes below. You should orient the shape nicely with the origin and/or the grid. The grid marks out 1cm squares.



(3) Write down equations for the curves/lines which bound the shape.

(4) Choose an orientation for the cross-sections:

PARALELL TO  $x$ -AXIS

PARALELL TO  $y$ -AXIS

(5) On your sketch of the base in part (2), add a thin rectangle in the proper direction to represent the base of a thin slice.

(6) Choose the shape of the cross-sections of the sculpture as one of the following shapes, and cut the sculpture approximately in half so that you can view the largest possible cross-section. Do not choose a square and/or rectangle for both the base and the cross-section unless there is an interesting orientation.

EQUILATERAL TRIANGLE

SEMI-CIRCLE

SQUARE

(7) Write down a complete description of the solid you've chose as done for Learning Objective 6 on the quizam.

(8) Build this sculpture from playdough. Be as accurate as you can be using the fishing line to sculpt and the rulers to check.

(9) Set up and evaluate a definite integral to determine the volume of the solid.

(10) Take some pictures of your sculpture to include in your report. Explore different angles and even cut it up so we can see what the slices look like.

(11) Does your answer make sense? What could you do to check your work with the tools we have? Do that!