Instructions: Your homework is in two parts, which you should turn in **separately**. Part A will be graded by an undergraduate grader. Roughly half of the points for part A will be awarded based on how many problems you attempt, and the other half will be for your solutions to a few particular problems (which I will choose later). Part B will be graded by your TA, and all of the problems will be graded thoroughly.

Due Wednesday, October 4, in lecture.

Week 1 Homework Problems, part A

1 Stewart, section 4.10: #3, 11, 12, 39, 40, 47, 63, 65, 75, 79

2 Stewart, section 5.1: #2, 3, 11, 14, 15, 17, 21, 22, 26

3 Stewart, section 5.2: #3, 5, 7, 9, 17, 34(a,b), 40, 48, 53, 57

Week 1 Homework Problems, part B

4 Your great aunt Gisella has left you a piece of land in her will, and the land includes a lovely small lake. But Aunt Gisella was a former calculus teacher and her will requires that you determine the area and perimeter of the lake before it becomes yours. Figure 1 is an aerial view of the lake with a 10 foot by 10 foot grid superimposed on it.

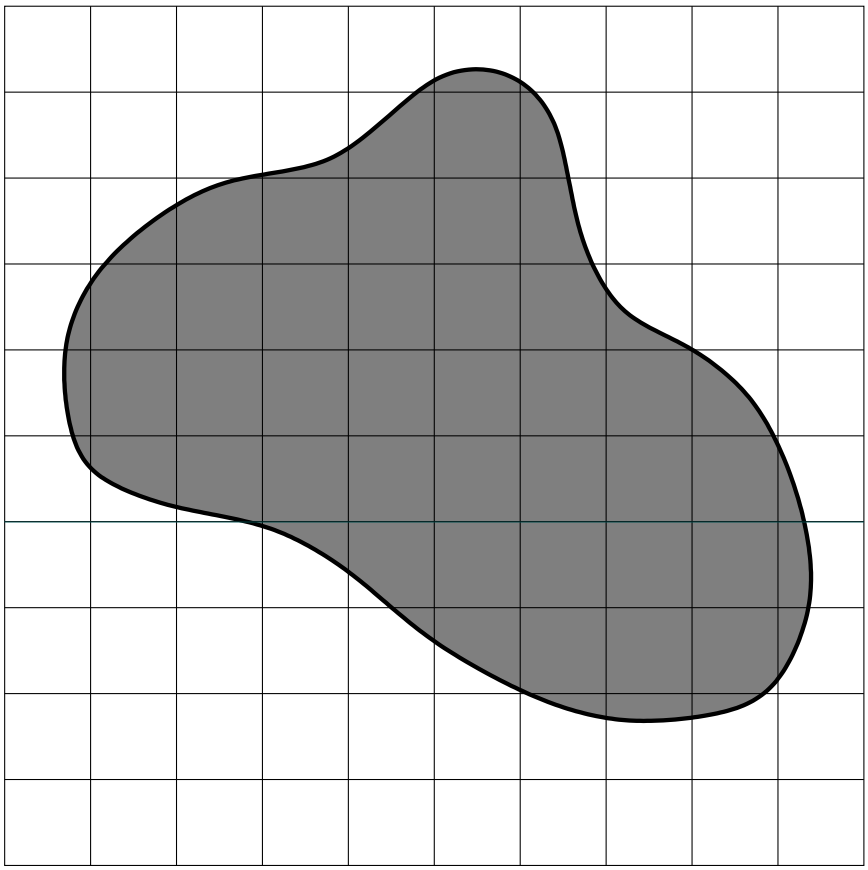


Figure 1: Aunt Gisella's lake

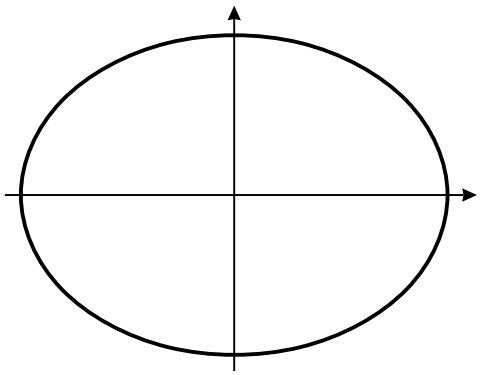
a) Estimate the area of the lake and explain in a few sentences how you obtained your estimate.
area $\approx$ _____

b) Estimate the perimeter of the lake and explain in a few sentences how you obtained your estimate.
perimeter $\approx$ _____

c) Construct two rectangluar lakes that have the same areas but different perimeters.
Lake A is _____ by _____. Lake B is _____ by _____.

d) Construct two rectangular lakes that have the same perimeters but different areas.
Lake C is _____ by _____. Lake D is _____ by _____.

5 The equation $\frac{x^2}{16} + \frac{y^2}{9} = 1$ defines an ellipse, which is graphed to the right. In this exercise we will approximate the area of the ellipse.



a) Explain why we need only find the area of the part of the ellipse lying in the First Quadrant.

b) Find the function $y = f(x)$ that gives the curve bounding the top of the ellipse.

c) Use $\Delta x = 1$ and midpoints to approximate the area of the part of the ellipse lying in the First Quadrant.

d) Approximate the total area of the ellipse.

6 For the following problems, the units of a variable are given along with the units for a function (or two functions). Give the units of each definite integral.

a) t is 'seconds,' $g(t)$ is 'feet/second^2.' Then $\int_a^b g(t)\,dt$ is _____.

b) x is 'days,' $f(x)$ is 'degrees F.' Then $\int_a^b f(x)\,dx$ is _____.

c) L is 'meters,' $f(L)$ is 'square meters.' Then $\int_a^b f(L)\,dL$ is _____.

d) t is 'minutes,' $g(t)$ is 'gallons/foot,' and $v(t)$ is 'feet/minute.'
Then $\int_a^b g(t)v(t)\,dt$ is _____.

e) s is 'seconds,' $f(s)$ is 'feet/second.' Then $\int_a^b f^2(s)\,ds$ is _____.

f) x is 'days,' $f(x)$ is 'flu cases per day.' Then $\int_a^b f(x)\,dx$ is _____.