

# Reading Assignment for Section 7.7

MATH 131: Calculus II, Section 1  
Spring Semester 2014

**Follow the general guidelines for the Reading Assignment (the salmon colored handout).**

Be sure to include and label all four standard parts 1,2,3,4 of the Reading Assignment in what you hand in. Be sure to **staple** together pages if you have more than one, and include your **name** at the top of at least the first page. Neatness is appreciated!!!

**Due:** by the beginning of class on Friday, March 28th

Read:

Section 7.7, pages 502-509: Improper Integrals!! Do the Quick Checks along the way! Check your answers to them at the end of the Exercises for Section 7.7!

Notes:

Now we will figure out how to think about integrals that do not exist as definite integrals like  $\int_{-1}^1 \frac{1}{x^4} dx$ .

We will use limits to evaluate integrals over intervals containing infinite discontinuities, like this example, and also integrals over infinite intervals of integration. Since we learned about surface area, we can even look at something really odd: Gabriel's Horn, which is an object that has finite volume but infinite surface area! WHAT?!!!! This is neat stuff!

**Remember that your answers should include complete sentences for every question. Be sure to address all parts of each question.**

Reading Questions for part (1):

a) Explain in your own words what the two types of “improper integrals” are that are introduced in this section are. What is so “improper” about them? Even though they exhibit “criminal” behavior, can they sometimes be “rehabilitated”? Explain.

b) On page 504 we look at the integral  $\int_0^\infty \frac{1}{1+x^2} dx$ . Note that  $\frac{1}{1+x^2}$  is always positive, so the integral of this function should represent area under the curve. The interval is infinite, which means the region we are considering is really an infinite region! But when the integral is evaluated we find that it has a value of  $\frac{\pi}{2}$ . How can it be infinite but equal to  $\frac{\pi}{2}$  at the same time? Doesn't this seem like a hoax? Explain!

Remember parts 2-4 on the salmon handout! **Reread the directions for these parts to be sure that you are answering the questions.** If you have lost your salmon handout, there is a link on our website to the Homework Guidelines.