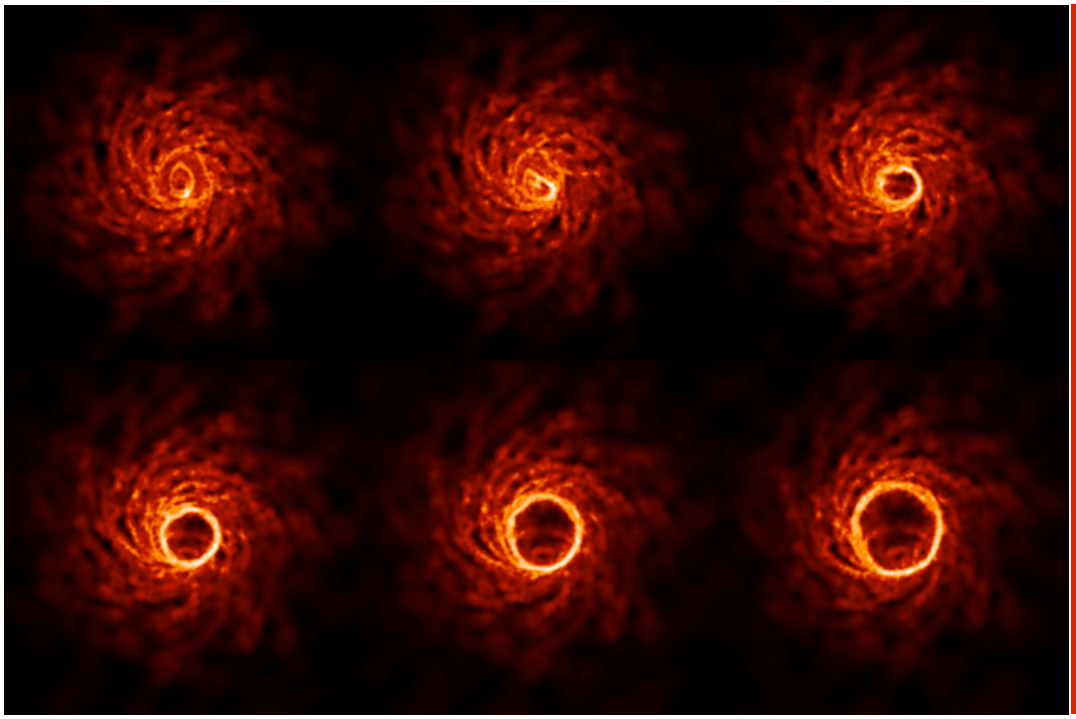
UCA Department of Physics and Astronomy

PHYS 3345: OPTICS

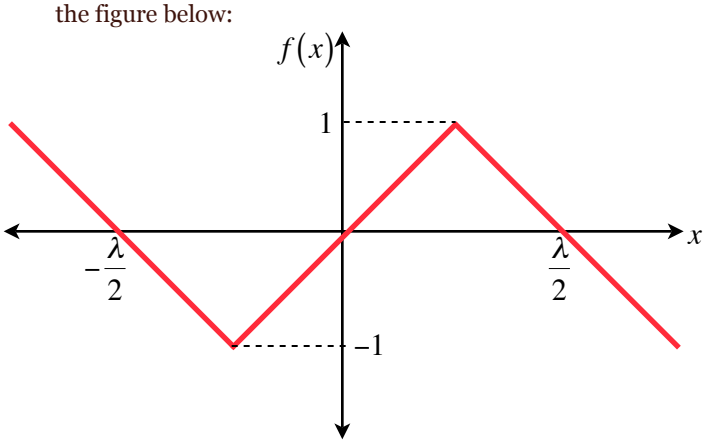


Fourier volume rendering is a volume visualization technique previously applied to regular grid data

Assignment 08: Chapter 07 Spring 2008
DUE: March 31, 2008

Work each problem neatly and completely. Unless otherwise noted, each problem is worth **5 points**. You should solve on green engineering paper or blank unruled paper. You must include sufficient demonstration of your problem solving process. If a problem is to be solved by inspection, state this. If graphs or plots are required, you should use an appropriate tool for their construction (there are several respectable options available on the computers in LSC 114).

1. (3 points) Hecht, Problem 7.13
2. (3 points) Hecht, Problem 7.14
3. Hecht, Problem 7.35
4. Find the Fourier series f(x) for the sawtooth wave shown in the figure below:



5. Plot the series above using 5 terms, and again using 10. Do you get a reasonable approximation of the sawtooth?

The *Schaum's Outline: Optics* supplement has many solved problems to assist you. In particular, you will find the following problems useful: 8.3, 8.26, 8.27, 8.28

Review Questions

These are not assigned for grading, but they are the sort of conceptual questions that you should be able to address adequately if they were to show up on an exam.

1. Cite two reasons why a pair of waves might have a non-zero phase difference.
2. Explain why you do not see interference when the light from two incandescent lamps overlaps.
3. Where are the nodes of a standing wave located? The antinodes?
4. Show how phasor addition can be used to illustrate the stationary nature of a standing wave.
5. Explain what is meant by beat frequency, carrier wave, modulation envelope.
6. Distinguish between phase velocity and group velocity. How is it possible for a group velocity to be greater than c?
7. For the square wave shown in Figure 7.30, how does changing the width of the peak change the number of terms required to obtain a reasonable profile?