

**ASTR 3740 Relativity & Cosmology Spring 2025. Problem Set 1.**  
**Due Wed 22 Jan**

**1. A Scene Seen near  $c$**

Explore the web to answer the four questions below. A good starting point is to play the “A Slower Speed of Light” game posted at

<http://gamelab.mit.edu/games/a-slower-speed-of-light/>

Describe what a scene looks like when you pass through it at near to the speed of light. In particular, answer as precisely as possible:

**(a) Aberration**

(5 points) In what way does the scene appear distorted?

**(b) Color Changes**

(5 points) Are the colors changed, and if so in what way?

**(c) Brightness**

(5 points) Is the scene changed in brightness, and if so in what way?

**(d) Time**

(5 points) Is the scene speeded up or slowed down, and if so in what way?

[Comments: This problem is a test of your powers of observation, and your ability to synthesize facts from a variety of sources into a coherent physical picture. You should reference the sites you use to draw your conclusions. Do not attempt to explain what you see mathematically — we will be discussing the problem mathematically in class later on.]

**2. What’s Wrong?**

(10 points) What is wrong with John Walker’s C-ship movie at

<http://www.fourmilab.to/cship/flythru.html>? [Hint: In what way does the movie agree or disagree with what you noticed in question 1?]