

Core Ideas of Unit 8 – Regions of Spacetime

There are three possible relationships between two events in spacetime: timelike, spacelike, or lightlike. The primary idea in this chapter is that the relationship between cause and effect cannot be altered by viewing the events in a different free-float frame. If event A cannot cause event B in a specific free-float frame, event A cannot cause event B in any free-float frame.

Be forewarned that some of the problems at the end of this chapter are very challenging and require serious and deep thinking about special relativity! On the positive side, serious and deep thinking are required for in-depth learning.

Assignment for Unit 8

- 1) Keeping the core ideas in mind, carefully read through **Chapter 6: Regions of Spacetime** in its entirety.
- 2) Now start re-reading the chapter with pencil and paper in hand.
- 3) Use the Lorentz equations connecting the Laboratory frame to left and right rocket frames to verify the spacetime diagrams in figures 6.1, 6.2, and 6.3.
- 4) Do Sample Problems 6.1, 6.2, and 6.3.
- 5) Take some time to study the different regions of space shown on figures 6.4 and 6.5.
- 6) Do practice exercises 6.1, 6.2, and 6.3.
- 7) Do problems 6.5 and 6.6. I found that making up numbers consistent with the premise of 6.5 and using them to draw a careful spacetime diagram helped me resolve the paradoxical situation posed in the problem.
- 8) If you would like to challenge yourself, take a stab at problems 6.7 and 6.8. I have copies of the **American Journal of Physics** articles cited in those problems.
- 9) When finished with the practice exercises and problems, bring them by my office. If everything looks okay, you will be given a quiz to test your mastery of the material in Unit 8.