ASTR 2030 Black Holes Spring 2006. In class group Project 1. Fri Sep 15

Scribe's name:

Names of other members of the group:

Twin paradox

Your twin leaves you on Earth and travels to the star-station Kant, 3 lightyears away, at a good fraction of the speed of light, then immediately returns to Earth at the same speed. The spacetime diagram shows the corresponding worldlines of both you and your twin.

Fill in your spacetime diagram with the following information:

1. Label the worldlines of you on the Earth, and of your traveling twin.
2. Label the worldline of the star-station Kant.
3. How fast does your twin travel, in units of the speed of light?

4. Draw and label the twin's "now" line when just arriving at Kant, and the twin's "now" line just departing from Kant (in the first case the twin is moving toward Kant, while in the second case the twin is moving back toward Earth).
5. How much do you and your twin age respectively during the round trip to Kant and back?

6. Draw and label the worldline of a light signal which travels from you on Earth, hits Kant just when your twin arrives, and immediately returns to Earth.
7. If your twin looks back at you through a telescope, how much does the twin see you to have aged at the moment the twin arrives at Kant?
8. If you look at your twin through a telescope, how much have you aged at the moment you see your twin arrive at Kant?