Problem Set #2

Due Friday, March 7 by 5pm to Dickinson 104

1. Taylor & Wheeler, 2nd Edition: Problem 3.5
2. Taylor & Wheeler, 2nd Edition: Problem 3.7
3. Taylor & Wheeler, 2nd Edition: Problem 3.15
4. A thin plate has a round hole whose diameter in its rest frame is D. The plate is parallel to the ground and moving upward, in the +y direction, relative to the ground. A thin round disk whose diameter in its rest frame is D is also parallel to the ground, but moving in the +x direction relative to it. In the frame of the ground, the plate and disk are on course so that the centers of the hole and the disk will at some point coincide. The disk is contracted, but the hole in the plate is not, so the disk will pass through the hole. Now, consider the frame of the disk. The disk is of diameter D, but the hole is contracted. Can the disk pass through the hole (*Hint: The answer is "yes.")* and, if so, how?
5. (**Note: While you can work together to discuss the concepts in this problem, each person should write their answer independently and in their own words.**) Explain to your friend, who is willing to accept that light moves at the same speed in any frame, why different observers may disagree on the length of a passing train.