

## Physics 263: Problem Set #2

These problems are due at the end of the day on Friday, April 10.

1. Shankar, problem 1.6.4, pg. 26. Let's restate part of the problem this way: given that  $v/c$  ranges from  $-1$  to  $1$ , let's define  $\theta$  by  $v/c = \tanh(\theta)$ . Then you'll want to observe that because of the hypertrig identity for  $\tanh(\theta_1 + \theta_2)$ , the rule for relativistic addition of velocities ( $v_3 = (v_1 + v_2)/(1 + v_1 v_2)$ ) is equivalent to the simple rule  $\theta_3 = \theta_1 + \theta_2$ .
2. Shankar, problem 8.1.2, pg. 209.
3. Shankar, problem 4.2.5 pg. 80.
4. Shankar, problem 4.3.3 pg. 85.
5. There will be a tutorial worksheet to hand in.
6. Morin 11.11 (Equal speeds) p. 551
7. Morin 11.13 (Equal transverse speeds) p. 551
8. Morin 11.20 (Throwing on a train) p. 553
9. Morin 11.36 (Triplets) p. 557
10. Morin 11.42 (Tunnel fraction) p. 559
11. Morin 11.53 (Angled photon) p. 561
12. (BONUS) Morin 11.57 (Bullets on a train)