Problem Set #4 due beginning of class, Monday Feb. 4. Please state the lens you are using and why. Remember that you are graded on your ***communication*** of physics understanding.

1. Exercise 1 in 3.0, changing reference frames

2. Exercise 2, in 3.1, What are the final velocities in this elastic collision?

3. Dragsters have a mass of about 1000 kg and the best dragsters get to 44 m/s in about 0.8 s.

a) What's the acceleration?

b) Estimate the coefficient of friction necessary to make this happen if you were in a regular car on flat ground.

c) What's the average power output during this 0.8 s?

d) Dragsters have their exhaust pipes pointed *upwards*, which ejects a huge amount of exhaust straight up into the air at very high velocity. What effect does this thrust have on the ability of the car to accelerate? *Why? Please start with clarification of reasons, drawings, lenses.*

According to my calculations, the engines kick out about 18 kg of exhaust every second at about 230 m/s.

e) What is the momentum of this amount of gas?

f) How much force should this put on the vehicle? In which direction?

g) With this extra "downforce", what coefficient of friction is necessary in order to accelerate the dragster?