Physics 2300: Problem Set #1

These problems are due on Tues Aug 29, either at class or later in the box in SM1011.

1. Complete the vector review sheet handout.

2. Morin 1.6 p. 14 (yes, the answer is given in the book, but do it on your own before checking!)

3. Morin 1.9 p. 15

4. Morin 1.10 p. 16

5. Morin 1.13 p. 16

6. An elevator ascends from the ground with uniform speed. A time $T_1$ later, a boy drops a marble through a hole in the floor. A time $T_2$ after that (i.e. $T_1 + T_2$ after start) the marble hits the ground. Find an expression for the height of the elevator at time $T_1$. (Local gravity is $g$.) What checks can you make?

7. (BONUS– Bonus problems are not required, but will help resolve borderline grades at the end of the quarter.) In problem 1.10, we consider a projectile launched perpendicular to the hill. Now generalize and allow ourselves to launch at an arbitrary angle $\phi$ (defined as the angle relative to horizontal, e.g. $\phi = \pi/2$ is vertical). Find the angle $\phi$ which maximizes the range of the projectile.

8. Shankar, problem 1.3.1 pg. 13. (Don’t overlook proving the identities.)

9. Shankar, problem 1.5.2 pg. 25.