

PROBLEM SET #6
Due Friday 23rd October 9am

READING: Young and Freedman §1.10 (scalar product only) and §6.1-3.

FORMAT: Please read the instructions on the web page concerning the required format for problem sets.

- 6-1)** Young and Freedman, exercises 1.54 and 1.55 page 31.
- 6-2)** Young and Freedman, exercises 6.3, and 6.4 page 204. Please use m , d and μ rather than the numerical values given and solve algebraically.
- 6-3)** Young and Freedman, exercise 6.7 page 204. Please use M , m and d instead of the numerical values given and solve algebraically.
- 6-4)** Young and Freedman, exercise 6.15, page 205. Please do each section *both* ways.
- 6-5)** Young and Freedman, exercise 6.27, page 206.
- 6-6)** Young and Freedman, exercise 6.37, page 207.
- 6-7)** Young and Freedman, exercise 6.65, page 208.
- 6-8)** A ball is launched from the ground at a 45 degree angle above the horizontal (which we take to be the x-axis). It rises to a maximum height, falls back down to the ground and bounces. After the bounce its velocity again makes a 45° angle to the horizontal x-axis, but the magnitude of the velocity right after the bounce is a factor of $\frac{3}{4}$ times the magnitude before the bounce. Letting the time of the launch be $t = 0$, the bounce occurs at $t = T$. After the bounce the ball rises to a new maximum height and then bounces a second time. You can ignore air resistance. Take the acceleration of gravity to be g .
 - a) What is the ball's maximum height between launch and the first bounce?
 - b) What is the magnitude of the ball's initial velocity?
 - c) How far does the ball travel between launch and the first bounce?
 - d) By what factor is the time between the first and second bounces smaller than or larger than the time between launch and the first bounce?
 - e) By what factor is the maximum height between the first and second bounces smaller than or larger than the maximum height between launch and the first bounce?
 - f) By what factor is the distance between the first and second bounces smaller than or larger than the distance between launch and the first bounce?