

Phys 410 – Homework #1

Numbered problems are from Taylor.

- 1) 1.36 (a, b and c) (9 pts).
- 2) 1.39 (9 pts).
 - a) Hint: the θ_{\max} at which the range is maximized is $(\pi/4 - \phi/2)$.
 - b) 3 points for proving Taylor's expression for the range, 3 points for proving the above expression for θ_{\max} , and 3 points for simplifying the expression for R_{\max} to the result as given by Taylor.
- 3) 1.51 (numerical problem) (6 pts).
 - a) You may use any software package you prefer, including excel.
 - b) Whatever software you use, *make sure that the important constants for the problem are specified in one and only one location*, so that you can change them easily. For this problem, some important constants are, for example, g , R , the initial angle, the initial angular velocity, and the time step (Δt).
 - c) Print out and turn in the first page of your code, along with the requested plots.

4) EXTRA CREDIT (3 pts) Atwood's machine is a vertical pulley with a rope suspending a mass on each side. The two masses are (m_1) and (m_2). See Taylor figure 4.15. Suppose the machine is fixed to the wall of an elevator, and the elevator is accelerating upward with constant acceleration (A). What is the tension in the rope?

Optional problems, for further study. If you attempt one of these, we will read your solution and give you written feedback. No extra credit. Solutions will be posted.

- 4) 1.5
- 5) 1.8
- 6) 1.18 (a and b)