

## Physics 262: Problem Set #2

These problems are due by the end of the day on Friday, Jan. 13 in the graders' box.

NOTE: For each problem, your solution should begin with a brief statement of the problem, i.e. a description of the setup, including a list of the inputs and the goal.

1. Shankar, problem 8.1.1 pg. 209.
2. Shankar, problem 8.1.7 pg. 211.
3. Morin 8.14 (Oscillating cylinders) p. 336
4. Morin 8.20 and 8.21 (The superball) p. 337
5. Morin 8.28 (Board and cylinders) p. 339
6. Morin 8.62 (Glancing off a stick) p. 345
7. Morin 8.67 (Striking a pool ball) p. 8.67
8. Morin 7.2 (Cross section) p. 296
9. A long distance from a planet of mass  $M$  and radius  $R$ , a small satellite is fired with speed  $v_0$  and "impact parameter"  $b$  (i.e. in the absence of gravity its straight line trajectory would miss the center of the planet by  $b$ ). Find the  $b$  such that the satellite just grazes the planet. Solve this in two ways: first by directly using the conservations laws, and then again using the effective potential technology, i.e. demanding that the turning point of the effective one-dimensional motion is  $R$ .
10. (BONUS) Morin 8.29 (Moving plane) p. 339