

PHYS 111

HOMework #5

Due : 29 Sept. 2016

Notes: 1) Please make sure you use units throughout all calculations. The deduction for not using units throughout your solution will increase for this homework, and will continue to increase episodically through the semester. 2) Next Tuesday office hours will be from 9-11 (with no afternoon hours that day). W and Th hours are the same this week.

1. A projectile is launched from level ground with an initial velocity of 30 m/s at an angle of 40° with respect to the horizon. Determine:

a) the time of flight (5)

b) the range of the projectile (5)

c) the maximum height above the ground (5)

d) the components of v_x and v_y when the projectile strikes the ground (5)

e) the magnitude of the velocity and angle the velocity vector makes with respect to the ground just as the projectile lands (10)

2. Problem 14, p. 90.

3. Problem 22, p. 91.

4. A projectile is launched from level ground with an initial velocity of v_o making an angle θ with the horizontal. At what angle must it be launched so that its range equals its maximum height?

5. A box slides along a (frictionless) table with speed v . The table is a height H above the ground. Determine expressions for the time the box will be in the air after sliding off the table, and how far the box lands from the edge of the table (find the horizontal distance from the edge of the table to the box' landing position).

6. Problem 40, p. 91

7. Problem 53, p. 92

8. Extra credit (this one is a little tougher, 15 points extra credit for a correct solution). An object is launched from the edge of a sheer cliff of height H at an angle θ with respect to the horizontal. If

the object lands a distance D from the base of the cliff, show that its maximum height above the ground is :

$$H_{\max} = H + \frac{D^2 \tan^2 \theta}{4 (H + D \tan \theta)}$$