

# PHYSICS 1050: Assignment #5

DUE: Tuesday February 9, 2016

## Readings:

- Chapter 2 of Franklin et al.
- Chapter 3 of Franklin et al.

## Problems:

- include name or PIN;
- staple your assignment;
- show all your work;
- all answers are to have three significant figures unless stated otherwise.

### 1. Problem 1.7 on page 13

### 2. Problem 1.9 on page 13

### 3. Mountains... here we come.

A ski jumper leaves a slope at an angle of 20.0 degrees above the horizontal direction. She lands 3.50 seconds later at a point 20.0 meters below her take-off point.

- What was her initial speed?
- How far does she travel horizontally?

### 4. Jumping Jack Flash

The froghopper, *Philaenus spumarius*, holds the world record for insect jumps. When leaping at an angle of 58.0 degrees above the horizontal, some of the tiny critters have reached a maximum height of 58.7 cm above the level ground. (See Nature, Vol. 424, 31 July 2003, p. 509.)

- What was the take-off speed for such a leap?
- What horizontal distance did the froghopper cover for this world record leap?

**5. A game of tennis...**

A tennis ball is served 2.00 degrees above the horizontal at a height of 2.40 meters, 12.0 meters from a net that is 0.900 meters high.

- (a) If the tennis ball is to clear the net by at least 0.200 meters, what is its minimum initial velocity?
- (b) If the tennis ball clears the net by 0.200 meters, where will it land?

**6. Canadian geese and Canadian snowbirds heading home in spring.**

Canadian snowbirds usually follow the I-15 at a speed of about 120 kilometers per hour. Canadian geese, on the other hand, migrate approximately along a north-south direction for well over a thousand kilometers in some cases, traveling at speeds up to about 100 kilometers per hour. Suppose one such bird (Candian goose) is flying at 100 kilometers per hour relative to the air, but there is a 70 kilometer per hour wind blowing from 30 degrees north of west,

- (a) at what direction should the bird head so that it will be traveling 20 degrees west of north relative to the ground?
- (b) How long will it take the bird to cover a ground distance of 1000 kilometers?