

## Practice problem set 4

### 1 Chapter 3, Problem 61

You throw a baseball at a  $45^\circ$  angle to the horizontal, aiming at a friend who's sitting in a tree a distance  $h$  above level ground. At the instant you throw your ball, your friend drops another ball. **(a)** Show that the two balls will collide, no matter what your ball's initial speed, provided it's greater than some minimum value. **(b)** Find an expression for that minimum speed.

### 2 Chapter 3, Problem 75

A jet is diving vertically downward at 1200 km/h. If the pilot can withstand a maximum acceleration of  $5g$  (i.e., 5 times Earth's gravitational acceleration) before losing consciousness, at what height must the plane start a  $90^\circ$  circular turn, from vertical to horizontal, in order to pull out of the dive? See Fig. 3.25, assume the speed remains constant, and neglect gravity.

### 3 Chapter 3, Problem 79

A soccer player can kick the ball 28 m on level ground, with its initial velocity at  $40^\circ$  to the horizontal. At the same initial speed and angle to the horizontal, what horizontal distance can the player kick the ball on a  $15^\circ$  upward slope?