**Assignment V, FYSE 130**
Fall 2014
Due 9/19/14 at start of class

Remember, work out and submit your answers on a separate piece of paper, and organize the solutions carefully! Feel free to work with your classmates on these problems, just make sure you make a note of this in your solutions.

1. A wide receiver in football runs a "fly" pattern (in other words, he just runs straight ahead after the start of the play). For simplicity, we'll put together a somewhat fake scenario that changes the rules of football just a little bit. First, we'll do everything in meters instead of yards. (That's not too bad – a meter and a yard are only off by about 10%, so you can think of your intuition regarding distances in meters instead of yards without messing up too much). Also, so we don't have to deal with a wide receiver speeding up and then reaching a steady speed, we'll let the wide receiver have a running head start (a la Canadian Football) so that at the moment the play begins, the receiver is running at a speed of 9 meters per second and stays that speed the entire play. At the moment the ball is snapped (the play begins), the wide receiver is exactly 10 meters from the quarterback as shown in the figure.
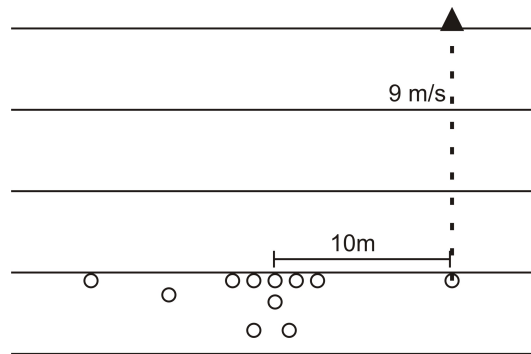
   a) If the Quarterback takes a 5 meter drop (retreats 5 meters from where he was given the ball) while the receiver sprints up the field, how far away would the quarterback be from the wide receiver after 1 second? (Leave your answer in meters, even though that's a bit unusual for football).

   b) If the Quarterback takes a 5 meter drop while the receiver sprints up the field, how far away would the quarterback be from the wide receiver after 2 seconds? (Again, leave your answer in meters).

c) If the Quarterback takes a 5 meter drop while the receiver sprints up the field, how far away would the quarterback be from the wide receiver after 4 seconds? (Again, leave your answer in meters).

d) Let's say the quarterback throws the football at 22 meters per second from 5 meters behind the line of scrimmage (these are both reasonable numbers). The ball is thrown at an angle 20 degrees above the horizontal. How far from the quarterback will the ball be when it is at the same height that it was at when the quarterback released it? (Hint: use the range equation!)

e) How long will the ball be in the air in part (d)?

f) How many meters past the line of scrimmage (the starting line) will the receiver be when he catches the pass described in part (d)?

g) How long after the snap should the quarterback throw the pass in part (d) so that the receiver can make the catch in stride?

h) How many meters past the line of scrimmage should the receiver be when the pass is thrown?

i) How high did the throw get at its peak?