Quiz No. 02 (2014 Summer)

PHYS 203A: College Physics

Date: 2014 Jun 17

(Name) (Signature)

1. (**20 points.**) You throw a stone vertically up.

   (a) What is the velocity of the stone when it is at the highest point?

   (b) What is the acceleration of the stone when it at the highest point?

2. (**30 points.**) Each second a rabbit moves half the distance from its nose to a head of lettuce. Assume the initial distance between the rabbit's nose and head of lettuce to be 2 m.

   (a) Plot the 'world-line' of the position of rabbit's nose for the first ten seconds in the graph provided in Fig. 1.

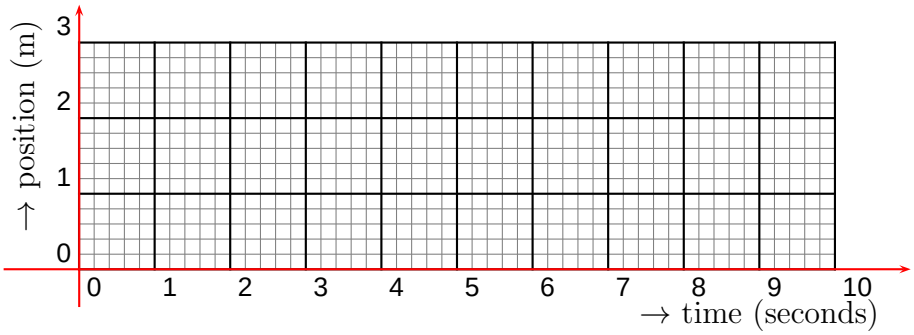

Figure 1: Problem 2

   (b) Estimate the limiting value of the rabbit's velocity, that is, its velocity after a very long time. (Hint: Slope of the 'world-line' represents velocity.)

   (c) The total distance covered by the rabbit, in meters, is given by

$$\Delta x = 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots . \tag{1}$$

   What can you conclude about the limiting value of the above sum?

3. (**20 points.**) A ball is thrown vertically upward with a speed of 10 m/s from the top of a building 50 m high. What is the velocity of the ball right before it hits the ground?

4. (**20 points.**) A speeder passes a parked police car at 40 m/s (=90 miles/hour). The police car starts from rest with a uniform acceleration of $3\,\mathrm{m/s^2}$, immediately after the speeder passes by. How far does the speeder get before being overtaken by the police car?